

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

SECTION EC

ENGINE CONTROL SYSTEM

CONTENTS

HR16DE

<p>BASIC INSPECTION15</p> <p>DIAGNOSIS AND REPAIR WORK FLOW15</p> <p style="padding-left: 20px;">Work Flow 15</p> <p style="padding-left: 20px;">Diagnostic Work Sheet 18</p> <p>INSPECTION AND ADJUSTMENT20</p> <p>BASIC INSPECTION20</p> <p style="padding-left: 20px;">BASIC INSPECTION : Special Repair Requirement 20</p> <p>ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT23</p> <p style="padding-left: 20px;">ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description23</p> <p style="padding-left: 20px;">ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement23</p> <p>IDLE SPEED24</p> <p style="padding-left: 20px;">IDLE SPEED : Description24</p> <p style="padding-left: 20px;">IDLE SPEED : Special Repair Requirement24</p> <p>IGNITION TIMING24</p> <p style="padding-left: 20px;">IGNITION TIMING : Description24</p> <p style="padding-left: 20px;">IGNITION TIMING : Special Repair Requirement...24</p> <p>VIN REGISTRATION24</p> <p style="padding-left: 20px;">VIN REGISTRATION : Description24</p> <p style="padding-left: 20px;">VIN REGISTRATION : Special Repair Requirement25</p> <p>ACCELERATOR PEDAL RELEASED POSITION LEARNING25</p> <p style="padding-left: 20px;">ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description25</p> <p style="padding-left: 20px;">ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement25</p> <p>THROTTLE VALVE CLOSED POSITION LEARNING25</p>	<p style="padding-left: 20px;">THROTTLE VALVE CLOSED POSITION LEARNING : Description25</p> <p style="padding-left: 20px;">THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement25</p> <p>IDLE AIR VOLUME LEARNING25</p> <p style="padding-left: 20px;">IDLE AIR VOLUME LEARNING : Description25</p> <p style="padding-left: 20px;">IDLE AIR VOLUME LEARNING : Special Repair Requirement26</p> <p>MIXTURE RATIO SELF-LEARNING VALUE CLEAR27</p> <p style="padding-left: 20px;">MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description27</p> <p style="padding-left: 20px;">MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement27</p> <p>FUNCTION DIAGNOSIS29</p> <p>ENGINE CONTROL SYSTEM29</p> <p style="padding-left: 20px;">System Diagram29</p> <p style="padding-left: 20px;">System Description30</p> <p style="padding-left: 20px;">Component Parts Location30</p> <p style="padding-left: 20px;">Component Description34</p> <p>MULTIPOINT FUEL INJECTION SYSTEM36</p> <p style="padding-left: 20px;">System Diagram36</p> <p style="padding-left: 20px;">System Description36</p> <p style="padding-left: 20px;">Component Parts Location39</p> <p style="padding-left: 20px;">Component Description43</p> <p>ELECTRIC IGNITION SYSTEM45</p> <p style="padding-left: 20px;">System Diagram45</p> <p style="padding-left: 20px;">System Description45</p> <p style="padding-left: 20px;">Component Parts Location46</p> <p style="padding-left: 20px;">Component Description50</p> <p>AIR CONDITIONING CUT CONTROL52</p> <p style="padding-left: 20px;">System Diagram52</p> <p style="padding-left: 20px;">System Description52</p> <p style="padding-left: 20px;">Component Parts Location53</p> <p style="padding-left: 20px;">Component Description57</p>
---	---

CAN COMMUNICATION	59	P0011 IVT CONTROL	126
System Description	59	DTC Logic	126
COOLING FAN CONTROL	60	Diagnosis Procedure	127
System Diagram	60	Component Inspection	128
System Description	60	P0031, P0032 A/F SENSOR 1 HEATER	130
Component Parts Location	62	Description	130
Component Description	66	DTC Logic	130
EVAPORATIVE EMISSION SYSTEM	68	Wiring Diagram	131
System Diagram	68	Diagnosis Procedure	131
System Description	68	Component Inspection	133
Component Parts Location	72	P0037, P0038 HO2S2 HEATER	134
Component Description	76	Description	134
INTAKE VALVE TIMING CONTROL	78	DTC Logic	134
System Diagram	78	Wiring Diagram	135
System Description	78	Diagnosis Procedure	135
Component Parts Location	79	Component Inspection	137
Component Description	83	P0075 IVT CONTROL SOLENOID VALVE	138
ON BOARD DIAGNOSTIC (OBD) SYSTEM	84	Description	138
Diagnosis Description	84	DTC Logic	138
CONSULT-III Function	98	Wiring Diagram	139
Diagnosis Tool Function	104	Diagnosis Procedure	139
Component Inspection	140	P0101 MAF SENSOR	142
COMPONENT DIAGNOSIS	106	Description	142
TROUBLE DIAGNOSIS - SPECIFICATION		DTC Logic	142
VALUE	106	Component Function Check	143
Description	106	Wiring Diagram	145
Component Function Check	106	Diagnosis Procedure	145
Diagnosis Procedure	107	Component Inspection	147
TROUBLE DIAGNOSIS FOR INTERMITTENT		P0102, P0103 MAF SENSOR	150
INCIDENT	114	Description	150
Description	114	DTC Logic	150
Diagnosis Procedure	114	Wiring Diagram	151
POWER SUPPLY AND GROUND CIRCUIT ..	115	Diagnosis Procedure	151
Wiring Diagram	115	Component Inspection	153
Diagnosis Procedure	115	P0112, P0113 IAT SENSOR	156
Ground Inspection	119	Description	156
U0101 CAN COMM CIRCUIT	120	DTC Logic	156
Description	120	Wiring Diagram	157
DTC Logic	120	Diagnosis Procedure	157
Wiring Diagram	121	Component Inspection	158
Diagnosis Procedure	121	P0116 ECT SENSOR	159
U0140 CAN COMM CIRCUIT	122	Description	159
Description	122	DTC Logic	159
DTC Logic	122	Diagnosis Procedure	160
Wiring Diagram	123	Component Inspection	160
Diagnosis Procedure	123	P0117, P0118 ECT SENSOR	161
U1001 CAN COMM CIRCUIT	124	Description	161
Description	124	DTC Logic	161
DTC Logic	124	Wiring Diagram	162
Wiring Diagram	125	Diagnosis Procedure	162
Diagnosis Procedure	125	Component Inspection	163

P0122, P0123 TP SENSOR	165	Component Function Check	207	
Description	165	Wiring Diagram	209	A
DTC Logic	165	Diagnosis Procedure	209	
Wiring Diagram	166	Component Inspection	212	
Diagnosis Procedure	166			
Component Inspection	168	P0139 HO2S2	215	EC
Special Repair Requirement	168	Description	215	
		DTC Logic	215	
P0125 ECT SENSOR	169	Component Function Check	216	C
Description	169	Wiring Diagram	218	
DTC Logic	169	Diagnosis Procedure	218	
Diagnosis Procedure	170	Component Inspection	220	D
Component Inspection	170			
		P0171 FUEL INJECTION SYSTEM FUNC-		
P0127 IAT SENSOR	172	TION	223	E
Description	172	DTC Logic	223	
DTC Logic	172	Wiring Diagram	225	
Diagnosis Procedure	173	Diagnosis Procedure	225	F
Component Inspection	173			
		P0172 FUEL INJECTION SYSTEM FUNC-		
P0128 THERMOSTAT FUNCTION	174	TION	229	G
DTC Logic	174	DTC Logic	229	
Diagnosis Procedure	174	Wiring Diagram	231	
Component Inspection	175	Diagnosis Procedure	231	
P0130 A/F SENSOR 1	176	P0181 FTT SENSOR	234	H
Description	176	Description	234	
DTC Logic	176	DTC Logic	234	
Component Function Check	177	Wiring Diagram	236	I
Wiring Diagram	179	Diagnosis Procedure	236	
Diagnosis Procedure	179	Component Inspection	238	
P0131 A/F SENSOR 1	182	P0182, P0183 FTT SENSOR	239	J
Description	182	Description	239	
DTC Logic	182	DTC Logic	239	
Wiring Diagram	184	Wiring Diagram	240	K
Diagnosis Procedure	184	Diagnosis Procedure	240	
		Component Inspection	242	
P0132 A/F SENSOR 1	187	P0222, P0223 TP SENSOR	243	L
Description	187	Description	243	
DTC Logic	187	DTC Logic	243	
Wiring Diagram	189	Wiring Diagram	244	M
Diagnosis Procedure	189	Diagnosis Procedure	244	
		Component Inspection	246	
		Special Repair Requirement	246	N
P0133 A/F SENSOR 1	192	P0300, P0301, P0302, P0303, P0304 MIS-		
Description	192	FIRE	247	O
DTC Logic	192	DTC Logic	247	
Wiring Diagram	194	Diagnosis Procedure	248	
Diagnosis Procedure	195			
		P0327, P0328 KS	253	P
		Description	253	
P0137 HO2S2	198	DTC Logic	253	
Description	198	Wiring Diagram	254	
DTC Logic	198	Diagnosis Procedure	254	
Component Function Check	199	Component Inspection	255	
Wiring Diagram	201			
Diagnosis Procedure	201	P0335 CKP SENSOR (POS)	257	
Component Inspection	203	Description	257	
P0138 HO2S2	206			
Description	206			
DTC Logic	206			

DTC Logic	257	P0451 EVAP CONTROL SYSTEM PRES- SURE SENSOR	306
Wiring Diagram	258	Description	306
Diagnosis Procedure	259	DTC Logic	306
Component Inspection	261	Diagnosis Procedure	306
		Component Inspection	308
P0340 CMP SENSOR (PHASE)	262	P0452 EVAP CONTROL SYSTEM PRES- SURE SENSOR	309
Description	262	Description	309
DTC Logic	262	DTC Logic	309
Wiring Diagram	264	Wiring Diagram	311
Diagnosis Procedure	264	Diagnosis Procedure	311
Component Inspection	266	Component Inspection	314
P0420 THREE WAY CATALYST FUNCTION. 267		P0453 EVAP CONTROL SYSTEM PRES- SURE SENSOR	316
DTC Logic	267	Description	316
Component Function Check	268	DTC Logic	316
Diagnosis Procedure	269	Wiring Diagram	318
		Diagnosis Procedure	318
P0441 EVAP CONTROL SYSTEM	272	Component Inspection	322
DTC Logic	272	P0455 EVAP CONTROL SYSTEM	323
Component Function Check	273	DTC Logic	323
Diagnosis Procedure	274	Diagnosis Procedure	324
Component Inspection (Drain filter)	277	Component Inspection (Fuel filler cap)	327
		Component Inspection (Drain filter)	328
P0442 EVAP CONTROL SYSTEM	278	P0456 EVAP CONTROL SYSTEM	329
DTC Logic	278	DTC Logic	329
Diagnosis Procedure	279	Component Function Check	331
Component Inspection (Fuel filler cap)	283	Diagnosis Procedure	331
Component Inspection (Drain filter)	283	Component Inspection (Fuel filler cap)	334
		Component Inspection (Drain filter)	335
P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	285	P0460 FUEL LEVEL SENSOR	336
Description	285	Description	336
DTC Logic	285	DTC Logic	336
Wiring Diagram	287	Diagnosis Procedure	336
Diagnosis Procedure	287	P0461 FUEL LEVEL SENSOR	337
Component Inspection	290	Description	337
		DTC Logic	337
P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	291	Component Function Check	337
Description	291	Diagnosis Procedure	338
DTC Logic	291	P0462, P0463 FUEL LEVEL SENSOR	339
Wiring Diagram	292	Description	339
Diagnosis Procedure	292	DTC Logic	339
Component Inspection	294	Diagnosis Procedure	339
		P0500 VSS	341
P0447 EVAP CANISTER VENT CONTROL VALVE	295	Description	341
Description	295	DTC Logic	341
DTC Logic	295	Component Function Check	342
Wiring Diagram	296	Diagnosis Procedure	342
Diagnosis Procedure	296	P0506 ISC SYSTEM	343
Component Inspection	298	Description	343
		DTC Logic	343
P0448 EVAP CANISTER VENT CONTROL VALVE	300		
Description	300		
DTC Logic	300		
Wiring Diagram	302		
Diagnosis Procedure	302		
Component Inspection	304		

Diagnosis Procedure	343	DTC Logic	372	
P0507 ISC SYSTEM	345	Diagnosis Procedure	372	A
Description	345	P1805 BRAKE SWITCH	373	
DTC Logic	345	Description	373	EC
Diagnosis Procedure	345	DTC Logic	373	
P0603 ECM POWER SUPPLY	347	Wiring Diagram	374	
Description	347	Diagnosis Procedure	374	C
DTC Logic	347	Component Inspection (Stop Lamp Switch)	376	
Diagnosis Procedure	347	P2100, P2103 THROTTLE CONTROL MO- TOR RELAY	377	D
P0605 ECM	349	Description	377	
Description	349	DTC Logic	377	E
DTC Logic	349	Wiring Diagram	378	
Diagnosis Procedure	350	Diagnosis Procedure	378	
P0607 ECM	351	P2101 ELECTRIC THROTTLE CONTROL FUNCTION	381	F
Description	351	Description	381	
DTC Logic	351	DTC Logic	381	
Diagnosis Procedure	351	Wiring Diagram	382	G
P0643 SENSOR POWER SUPPLY	352	Diagnosis Procedure	382	
DTC Logic	352	Component Inspection	385	
Wiring Diagram	353	Special Repair Requirement	385	H
Diagnosis Procedure	353	P2118 THROTTLE CONTROL MOTOR	386	
P0850 PNP SWITCH	356	Description	386	I
Description	356	DTC Logic	386	
DTC Logic	356	Wiring Diagram	387	J
Component Function Check	357	Diagnosis Procedure	387	
Wiring Diagram	358	Component Inspection	388	
Diagnosis Procedure	358	Special Repair Requirement	389	
P1148 CLOSED LOOP CONTROL	361	P2119 ELECTRIC THROTTLE CONTROL ACTUATOR	390	K
DTC Logic	361	Description	390	
P1217 ENGINE OVER TEMPERATURE	362	DTC Logic	390	L
DTC Logic	362	Diagnosis Procedure	390	
Component Function Check	362	Special Repair Requirement	391	
Diagnosis Procedure	363	P2122, P2123 APP SENSOR	392	M
P1225 TP SENSOR	366	Description	392	
Description	366	DTC Logic	392	
DTC Logic	366	Wiring Diagram	393	N
Diagnosis Procedure	366	Diagnosis Procedure	393	
Special Repair Requirement	367	Component Inspection	395	
P1226 TP SENSOR	368	Special Repair Requirement	395	
Description	368	P2127, P2128 APP SENSOR	396	O
DTC Logic	368	Description	396	
Diagnosis Procedure	368	DTC Logic	396	
Special Repair Requirement	369	Wiring Diagram	397	P
P1421 COLD START CONTROL	370	Diagnosis Procedure	397	
Description	370	Component Inspection	399	
DTC Logic	370	Special Repair Requirement	400	
Diagnosis Procedure	370	P2135 TP SENSOR	401	
P1715 INPUT SPEED SENSOR (PRIMARY SPEED SENSOR)	372	Description	401	
Description	372	DTC Logic	401	

Wiring Diagram	402	ON BOARD REFUELING VAPOR RECOVERY (ORVR)	443
Diagnosis Procedure	402	Description	443
Component Inspection	404	Component Function Check	443
Special Repair Requirement	404	Diagnosis Procedure	443
P2138 APP SENSOR	405	Component Inspection (Refueling EVAP vapor cut valve)	446
Description	405	Component Inspection (Drain filter)	448
DTC Logic	405	POSITIVE CRANKCASE VENTILATION	449
Wiring Diagram	406	Description	449
Diagnosis Procedure	406	Component Inspection	449
Component Inspection	409	REFRIGERANT PRESSURE SENSOR	450
Special Repair Requirement	409	Description	450
P2A00 A/F SENSOR 1	410	Component Function Check	450
Description	410	Wiring Diagram	451
DTC Logic	410	Diagnosis Procedure	451
Wiring Diagram	411	ECU DIAGNOSIS	454
Diagnosis Procedure	412	ECM	454
COOLING FAN	415	Reference Value	454
Description	415	Wiring Diagram — ENGINE CONTROL SYSTEM	
Component Function Check	415	—	464
Wiring Diagram	416	Fail Safe	465
Diagnosis Procedure	417	DTC Inspection Priority Chart	467
Component Inspection	419	DTC Index	468
ELECTRICAL LOAD SIGNAL	421	How to Set SRT Code	471
Description	421	How to Erase Permanent DTC	473
Component Function Check	421	Test Value and Test Limit	477
Diagnosis Procedure	421	SYMPTOM DIAGNOSIS	484
FUEL INJECTOR	423	ENGINE CONTROL SYSTEM SYMPTOMS ...	484
Description	423	Symptom Table	484
Component Function Check	423	NORMAL OPERATING CONDITION	488
Wiring Diagram	424	Description	488
Diagnosis Procedure	424	PRECAUTION	489
Component Inspection	425	PRECAUTIONS	489
FUEL PUMP	427	Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"	489
Description	427	Precaution Necessary for Steering Wheel Rotation After Battery Disconnect	489
Component Function Check	427	Precaution for Procedure without Cowl Top Cover	490
Wiring Diagram	428	On Board Diagnosis (OBD) System of Engine and A/T	490
Diagnosis Procedure	428	General Precautions	490
Component Inspection	430	PREPARATION	494
IGNITION SIGNAL	432	PREPARATION	494
Description	432	Special Service Tools	494
Component Function Check	432	Commercial Service Tools	494
Wiring Diagram	433	ON-VEHICLE MAINTENANCE	496
Diagnosis Procedure	434		
Component Inspection (Ignition Coil with Power Transistor)	437		
Component Inspection (Condenser-2)	438		
MALFUNCTION INDICATOR LAMP	439		
Description	439		
Component Function Check	439		
Wiring Diagram	440		
Diagnosis Procedure	441		

FUEL PRESSURE	496	Fuel Cut Control (at No Load and High Engine Speed)	519	A
Inspection	496			
EVAP LEAK CHECK	498	AIR CONDITIONING CUT CONTROL	521	
Inspection	498	Input/Output Signal Chart	521	
ON-VEHICLE REPAIR	500	System Description	521	EC
EVAP CANISTER	500	AUTOMATIC SPEED CONTROL DEVICE (ASCD)	522	
Exploded View	500	System Description	522	C
Removal and Installation	500	Component Description	523	
Inspection	501	CAN COMMUNICATION	524	
SERVICE DATA AND SPECIFICATIONS (SDS)	502	System Description	524	D
SERVICE DATA AND SPECIFICATIONS (SDS)	502	EVAPORATIVE EMISSION SYSTEM	525	
Idle Speed	502	Description	525	E
Ignition Timing	502	Component Inspection	527	
Calculated Load Value	502	Exploded View	529	F
Mass Air Flow Sensor	502	Removal and Installation	529	
		How to Detect Fuel Vapor Leakage	530	
		ON BOARD REFUELING VAPOR RECOVERY (ORVR)	532	G
		System Description	532	
		Diagnosis Procedure	532	H
		Component Inspection	535	
		POSITIVE CRANKCASE VENTILATION	538	
		Description	538	I
		Component Inspection	538	
		NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM-NATS)	540	J
		Description	540	
		ON BOARD DIAGNOSTIC (OBD) SYSTEM ..	541	K
		Introduction	541	
		Two Trip Detection Logic	541	
		Emission-related Diagnostic Information	542	L
		Malfunction Indicator Lamp (MIL)	565	
		OBD System Operation Chart	568	
		BASIC SERVICE PROCEDURE	574	M
		Basic Inspection	574	
		Idle Speed and Ignition Timing Check	578	
		Procedure After Replacing ECM	579	N
		VIN Registration	580	
		Accelerator Pedal Released Position Learning	580	
		Throttle Valve Closed Position Learning	580	O
		Idle Air Volume Learning	580	
		Fuel Pressure Check	582	
		TROUBLE DIAGNOSIS	585	P
		Trouble Diagnosis Introduction	585	
		DTC Inspection Priority Chart	590	
		Fail-Safe Chart	590	
		Symptom Matrix Chart	592	
		Engine Control Component Parts Location	596	
		Vacuum Hose Drawing	602	
		Circuit Diagram	603	
MR18DE				
SERVICE INFORMATION	503			
INDEX FOR DTC	503			
U0101-U1001	503			
P0011-P0075	503			
P0101-P0128	503			
P0130-P0183	504			
P0222-P0420	504			
P0441-P0463	505			
P0500-P0643	505			
P0705-P0734	506			
P0740-P0840	506			
P0850-P1574	507			
P1610-P1615	507			
P1715-P1805	507			
P2100-P2A00	508			
PRECAUTIONS	509			
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"	509			
Precaution Necessary for Steering Wheel Rotation After Battery Disconnect	509			
Precaution for Procedure without Cowl Top Cover. 510				
On Board Diagnosis (OBD) System of Engine and A/T, CVT	510			
Precaution	510			
PREPARATION	514			
Special Service Tool	514			
Commercial Service Tool	514			
ENGINE CONTROL SYSTEM	516			
Schematic	516			
Multiport Fuel Injection (MFI) System	516			
Electronic Ignition (EI) System	519			

ECM Harness Connector Terminal Layout	605	Wiring Diagram	650
ECM Terminal and Reference Value	605	Diagnosis Procedure	651
CONSULT-III Function (ENGINE)	612	Component Inspection	652
Generic Scan Tool (GST) Function	618	Removal and Installation	653
CONSULT-III Reference Value in Data Monitor Mode	620	DTC P0037, P0038 HO2S2 HEATER	654
TRouble DIAGNOSIS - SPECIFICATION VALUE	624	Description	654
Description	624	CONSULT-III Reference Value in Data Monitor Mode	654
Testing Condition	624	On Board Diagnosis Logic	654
Inspection Procedure	624	DTC Confirmation Procedure	654
Diagnosis Procedure	624	Wiring Diagram	655
TRouble DIAGNOSIS FOR INTERMITTENT INCIDENT	632	Diagnosis Procedure	656
Description	632	Component Inspection	658
Diagnosis Procedure	632	Removal and Installation	658
POWER SUPPLY AND GROUND CIRCUIT ..	633	DTC P0075 IVT CONTROL SOLENOID VALVE	659
Wiring Diagram	633	Component Description	659
Diagnosis Procedure	634	CONSULT-III Reference Value in Data Monitor Mode	659
Ground Inspection	638	On Board Diagnosis Logic	659
DTC U0101 CAN COMMUNICATION LINE ...	639	DTC Confirmation Procedure	659
Description	639	Wiring Diagram	660
On Board Diagnosis Logic	639	Diagnosis Procedure	661
DTC Confirmation Procedure	639	Component Inspection	662
Wiring Diagram	640	Removal and Installation	663
Diagnosis Procedure	640	DTC P0101 MAF SENSOR	664
DTC U0140 CAN COMMUNICATION LINE ...	641	Component Description	664
Description	641	CONSULT-III Reference Value in Data Monitor Mode	664
On Board Diagnosis Logic	641	On Board Diagnosis Logic	664
DTC Confirmation Procedure	641	DTC Confirmation Procedure	664
Wiring Diagram	642	Overall Function Check	665
Diagnosis Procedure	642	Wiring Diagram	667
DTC U1001 CAN COMMUNICATION LINE ...	643	Diagnosis Procedure	668
Description	643	Component Inspection	670
On Board Diagnosis Logic	643	Removal and Installation	671
DTC Confirmation Procedure	643	DTC P0102, P0103 MAF SENSOR	672
Wiring Diagram	644	Component Description	672
Diagnosis Procedure	644	CONSULT-III Reference Value in Data Monitor Mode	672
DTC P0011 IVT CONTROL	645	On Board Diagnosis Logic	672
Description	645	DTC Confirmation Procedure	672
CONSULT-III Reference Value in Data Monitor Mode	645	Wiring Diagram	674
On Board Diagnosis Logic	646	Diagnosis Procedure	675
DTC Confirmation Procedure	646	Component Inspection	677
Diagnosis Procedure	647	Removal and Installation	678
Component Inspection	648	DTC P0112, P0113 IAT SENSOR	679
Removal and Installation	648	Component Description	679
DTC P0031, P0032 A/F SENSOR 1 HEATER.	649	On Board Diagnosis Logic	679
Description	649	DTC Confirmation Procedure	679
CONSULT-III Reference Value in Data Monitor Mode	649	Wiring Diagram	680
On Board Diagnosis Logic	649	Diagnosis Procedure	680
DTC Confirmation Procedure	649	Component Inspection	682
		Removal and Installation	682

DTC P0116 ECT SENSOR	683	Removal and Installation	709	A
Component Description	683	DTC P0131 A/F SENSOR 1	710	EC
On Board Diagnosis Logic	683	Component Description	710	
DTC Confirmation Procedure	683	CONSULT-III Reference Value in Data Monitor		
Diagnosis Procedure	684	Mode	710	C
Component Inspection	684	On Board Diagnosis Logic	710	
Removal and Installation	685	DTC Confirmation Procedure	710	
DTC P0117, P0118 ECT SENSOR	686	Wiring Diagram	712	D
Component Description	686	Diagnosis Procedure	713	
On Board Diagnosis Logic	686	Removal and Installation	715	E
DTC Confirmation Procedure	687	DTC P0132 A/F SENSOR 1	716	
Wiring Diagram	688	Component Description	716	
Diagnosis Procedure	688	CONSULT-III Reference Value in Data Monitor		
Component Inspection	690	Mode	716	F
Removal and Installation	690	On Board Diagnosis Logic	716	
DTC P0122, P0123 TP SENSOR	691	DTC Confirmation Procedure	716	G
Component Description	691	Wiring Diagram	718	
CONSULT-III Reference Value in Data Monitor		Diagnosis Procedure	719	
Mode	691	Removal and Installation	721	H
On Board Diagnosis Logic	691	DTC P0137 HO2S2	722	
DTC Confirmation Procedure	691	Component Description	722	
Wiring Diagram	692	CONSULT-III Reference Value in Data Monitor		
Diagnosis Procedure	693	Mode	722	I
Component Inspection	695	On Board Diagnosis Logic	722	
Removal and Installation	695	DTC Confirmation Procedure	723	J
DTC P0125 ECT SENSOR	696	Overall Function Check	723	
Component Description	696	Wiring Diagram	725	K
On Board Diagnosis Logic	696	Diagnosis Procedure	726	
DTC Confirmation Procedure	696	Component Inspection	728	
Diagnosis Procedure	697	Removal and Installation	730	L
Component Inspection	698	DTC P0138 HO2S2	731	
Removal and Installation	698	Component Description	731	
DTC P0127 IAT SENSOR	699	CONSULT-III Reference Value in Data Monitor		
Component Description	699	Mode	731	M
On Board Diagnosis Logic	699	On Board Diagnosis Logic	731	
DTC Confirmation Procedure	699	DTC Confirmation Procedure	732	
Diagnosis Procedure	700	Overall Function Check	732	
Component Inspection	700	Wiring Diagram	734	N
Removal and Installation	701	Diagnosis Procedure	735	
DTC P0128 THERMOSTAT FUNCTION	702	Component Inspection	738	
On Board Diagnosis Logic	702	Removal and Installation	740	O
DTC Confirmation Procedure	702	DTC P0139 HO2S2	741	
Diagnosis Procedure	702	Component Description	741	
Component Inspection	703	CONSULT-III Reference Value in Data Monitor		
Removal and Installation	703	Mode	741	P
DTC P0130 A/F SENSOR 1	704	On Board Diagnosis Logic	741	
Component Description	704	DTC Confirmation Procedure	741	
CONSULT-III Reference Value in Data Monitor		Overall Function Check	743	
Mode	704	Wiring Diagram	744	
On Board Diagnosis Logic	704	Diagnosis Procedure	745	
DTC Confirmation Procedure	704	Component Inspection	747	
Overall Function Check	705	Removal and Installation	749	
Wiring Diagram	706	DTC P014C, P014D, P015A, P015B, A/F SEN-		
Diagnosis Procedure	707	SOR 1	750	

Component Description	750	On Board Diagnosis Logic	789
CONSULT-III Reference Value in Data Monitor Mode	750	DTC Confirmation Procedure	789
On Board Diagnosis Logic	750	Wiring Diagram	790
DTC Confirmation Procedure	751	Diagnosis Procedure	791
Wiring Diagram	753	Component Inspection	792
Diagnosis Procedure	754	Removal and Installation	792
Removal and Installation	757		
DTC P0171 FUEL INJECTION SYSTEM FUNCTION	758	DTC P0335 CKP SENSOR (POS)	793
On Board Diagnosis Logic	758	Component Description	793
DTC Confirmation Procedure	758	CONSULT-III Reference Value in Data Monitor Mode	793
Wiring Diagram	760	On Board Diagnosis Logic	793
Diagnosis Procedure	761	DTC Confirmation Procedure	793
		Wiring Diagram	794
		Diagnosis Procedure	795
		Component Inspection	798
		Removal and Installation	798
DTC P0172 FUEL INJECTION SYSTEM FUNCTION	764	DTC P0340 CMP SENSOR (PHASE)	799
On Board Diagnosis Logic	764	Component Description	799
DTC Confirmation Procedure	764	CONSULT-III Reference Value in Data Monitor Mode	799
Wiring Diagram	766	On Board Diagnosis Logic	799
Diagnosis Procedure	767	DTC Confirmation Procedure	799
		Wiring Diagram	800
		Diagnosis Procedure	801
		Component Inspection	803
		Removal and Installation	804
DTC P0181 FTT SENSOR	770	DTC P0420 THREE WAY CATALYST FUNCTION	805
Component Description	770	On Board Diagnosis Logic	805
On Board Diagnosis Logic	770	DTC Confirmation Procedure	805
DTC Confirmation Procedure	770	Overall Function Check	805
Wiring Diagram	771	Diagnosis Procedure	806
Diagnosis Procedure	771		
Component Inspection	773	DTC P0441 EVAP CONTROL SYSTEM	810
Removal and Installation	773	System Description	810
		On Board Diagnosis Logic	810
		DTC Confirmation Procedure	810
		Overall Function Check	811
		Diagnosis Procedure	811
		Component Inspection	814
DTC P0182, P0183 FTT SENSOR	774	DTC P0442 EVAP CONTROL SYSTEM	815
Component Description	774	On Board Diagnosis Logic	815
On Board Diagnosis Logic	774	DTC Confirmation Procedure	816
DTC Confirmation Procedure	774	Diagnosis Procedure	816
Wiring Diagram	775	Component Inspection	821
Diagnosis Procedure	775		
Component Inspection	777	DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	822
Removal and Installation	777	Description	822
		CONSULT-III Reference Value in Data Monitor Mode	822
		On Board Diagnosis Logic	823
		DTC Confirmation Procedure	823
		Wiring Diagram	825
		Diagnosis Procedure	826
		Component Inspection	829
DTC P0222, P0223 TP SENSOR	778		
Component Description	778		
CONSULT-III Reference Value in Data Monitor Mode	778		
On Board Diagnosis Logic	778		
DTC Confirmation Procedure	778		
Wiring Diagram	779		
Diagnosis Procedure	780		
Component Inspection	782		
Removal and Installation	782		
DTC P0300 - P0304 MULTIPLE CYLINDER MISFIRE, NO. 1 - 4 CYLINDER MISFIRE	783		
On Board Diagnosis Logic	783		
DTC Confirmation Procedure	783		
Diagnosis Procedure	784		
DTC P0327, P0328 KS	789		
Component Description	789		

Removal and Installation	829	CONSULT-III Reference Value in Data Monitor Mode	858	A
DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	830	On Board Diagnosis Logic	858	
Description	830	DTC Confirmation Procedure	859	EC
CONSULT-III Reference Value in Data Monitor Mode	830	Wiring Diagram	860	
On Board Diagnosis Logic	831	Diagnosis Procedure	861	
DTC Confirmation Procedure	831	Component Inspection	865	
Wiring Diagram	832	DTC P0455 EVAP CONTROL SYSTEM	866	C
Diagnosis Procedure	833	On Board Diagnosis Logic	866	
Component Inspection	834	DTC Confirmation Procedure	866	D
Removal and Installation	835	Diagnosis Procedure	867	
DTC P0447 EVAP CANISTER VENT CON- TROL VALVE	836	Component Inspection	872	
Component Description	836	DTC P0456 EVAP CONTROL SYSTEM	873	E
CONSULT-III Reference Value in Data Monitor Mode	836	On Board Diagnosis Logic	873	
On Board Diagnosis Logic	836	DTC Confirmation Procedure	874	
DTC Confirmation Procedure	836	Overall Function Check	874	F
Wiring Diagram	837	Diagnosis Procedure	875	
Diagnosis Procedure	838	Component Inspection	880	
Component Inspection	840	DTC P0460 FUEL LEVEL SENSOR	881	G
DTC P0448 EVAP CANISTER VENT CON- TROL VALVE	842	Component Description	881	
Component Description	842	On Board Diagnosis Logic	881	
CONSULT-III Reference Value in Data Monitor Mode	842	DTC Confirmation Procedure	881	H
On Board Diagnosis Logic	842	Diagnosis Procedure	881	
DTC Confirmation Procedure	842	Removal and Installation	882	
Wiring Diagram	844	DTC P0461 FUEL LEVEL SENSOR	883	I
Diagnosis Procedure	845	Component Description	883	
Component Inspection	846	On Board Diagnosis Logic	883	
DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR	848	Overall Function Check	883	J
Component Description	848	Diagnosis Procedure	884	
CONSULT-III Reference Value in Data Monitor Mode	848	Removal and Installation	884	
On Board Diagnosis Logic	848	DTC P0462, P0463 FUEL LEVEL SENSOR ..	885	K
DTC Confirmation Procedure	848	Component Description	885	
Diagnosis Procedure	849	On Board Diagnosis Logic	885	
Component Inspection	850	DTC Confirmation Procedure	885	L
DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR	851	Diagnosis Procedure	885	
Component Description	851	Removal and Installation	886	
CONSULT-III Reference Value in Data Monitor Mode	851	DTC P0500 VSS	887	M
On Board Diagnosis Logic	851	Description	887	
DTC Confirmation Procedure	851	On Board Diagnosis Logic	887	
Wiring Diagram	853	DTC Confirmation Procedure	887	N
Diagnosis Procedure	854	Overall Function Check	888	
Component Inspection	857	Diagnosis Procedure	888	
DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR	858	DTC P0506 ISC SYSTEM	889	O
Component Description	858	Description	889	
		On Board Diagnosis Logic	889	
		DTC Confirmation Procedure	889	P
		Diagnosis Procedure	889	
		DTC P0507 ISC SYSTEM	891	
		Description	891	
		On Board Diagnosis Logic	891	
		DTC Confirmation Procedure	891	
		Diagnosis Procedure	891	

DTC P0605 ECM	893	DTC P1226 TP SENSOR	921
Component Description	893	Component Description	921
On Board Diagnosis Logic	893	On Board Diagnosis Logic	921
DTC Confirmation Procedure	893	DTC Confirmation Procedure	921
Diagnosis Procedure	894	Diagnosis Procedure	921
DTC P0607 ECM	895	Removal and Installation	922
Description	895	DTC P1421 COLD START CONTROL	923
On Board Diagnosis Logic	895	Description	923
DTC Confirmation Procedure	895	On Board Diagnosis Logic	923
Diagnosis Procedure	895	DTC Confirmation Procedure	923
DTC P0643 SENSOR POWER SUPPLY	896	Diagnosis Procedure	923
On Board Diagnosis Logic	896	DTC P1564 ASCD STEERING SWITCH	925
DTC Confirmation Procedure	896	Component Description	925
Wiring Diagram	897	CONSULT-III Reference Value in Data Monitor	
Diagnosis Procedure	898	Mode	925
DTC P0850 PNP SWITCH	901	On Board Diagnosis Logic	925
Component Description	901	DTC Confirmation Procedure	926
CONSULT-III Reference Value in Data Monitor		Wiring Diagram	927
Mode	901	Diagnosis Procedure	928
On Board Diagnosis Logic	901	Component Inspection	930
DTC Confirmation Procedure	901	DTC P1572 ASCD BRAKE SWITCH	931
Overall Function Check	902	Component Description	931
Wiring Diagram	903	CONSULT-III Reference Value in Data Monitor	
Diagnosis Procedure	904	Mode	931
DTC P1148 CLOSED LOOP CONTROL	907	On Board Diagnosis Logic	931
On Board Diagnosis Logic	907	DTC Confirmation Procedure	932
DTC P1211 TCS CONTROL UNIT	908	Wiring Diagram	933
Description	908	Diagnosis Procedure	934
On Board Diagnosis Logic	908	Component Inspection	938
DTC Confirmation Procedure	908	DTC P1574 ASCD VEHICLE SPEED SEN-	
Diagnosis Procedure	908	SOR	940
DTC P1212 TCS COMMUNICATION LINE	909	Component Description	940
Description	909	On Board Diagnosis Logic	940
On Board Diagnosis Logic	909	DTC Confirmation Procedure	940
DTC Confirmation Procedure	909	Diagnosis Procedure	940
Diagnosis Procedure	909	DTC P1715 INPUT SPEED SENSOR	942
DTC P1217 ENGINE OVER TEMPERATURE.	910	A/T	942
System Description	910	A/T : Description	942
CONSULT-III Reference Value in Data Monitor		A/T : CONSULT-III Reference Value in Data Mon-	
Mode	911	itor Mode	942
On Board Diagnosis Logic	911	A/T : On Board Diagnosis Logic	942
Overall Function Check	911	A/T : Diagnosis Procedure	942
Wiring Diagram	913	CVT	942
Diagnosis Procedure	914	CVT : Description	942
Main 13 Causes of Overheating	917	CVT : CONSULT-III Reference Value in Data	
Component Inspection	918	Monitor Mode	942
DTC P1225 TP SENSOR	919	CVT : On Board Diagnosis Logic	943
Component Description	919	CVT : DTC Confirmation Procedure	943
On Board Diagnosis Logic	919	CVT : Diagnosis Procedure	943
DTC Confirmation Procedure	919	DTC P1805 BRAKE SWITCH	944
Diagnosis Procedure	919	Description	944
Removal and Installation	920	CONSULT-III Reference Value in Data Monitor	
		Mode	944

On Board Diagnosis Logic	944	Diagnosis Procedure	973	
DTC Confirmation Procedure	944	Component Inspection	975	A
Wiring Diagram	945	Removal and Installation	976	
Diagnosis Procedure	946			
Component Inspection	947			
DTC P2100, P2103 THROTTLE CONTROL MOTOR RELAY	948	DTC P2135 TP SENSOR	977	EC
Component Description	948	Component Description	977	
CONSULT-III Reference Value in Data Monitor		CONSULT-III Reference Value in Data Monitor		
Mode	948	Mode	977	C
On Board Diagnosis Logic	948	On Board Diagnosis Logic	977	
DTC Confirmation Procedure	948	DTC Confirmation Procedure	977	
Wiring Diagram	949	Wiring Diagram	978	D
Diagnosis Procedure	950	Diagnosis Procedure	979	
		Component Inspection	981	
		Removal and Installation	981	
DTC P2101 ELECTRIC THROTTLE CONTROL FUNCTION	952	DTC P2138 APP SENSOR	982	E
Description	952	Component Description	982	
On Board Diagnosis Logic	952	CONSULT-III Reference Value in Data Monitor		
DTC Confirmation Procedure	952	Mode	982	F
Wiring Diagram	953	On Board Diagnosis Logic	982	
Diagnosis Procedure	954	DTC Confirmation Procedure	983	
Component Inspection	957	Wiring Diagram	984	G
Removal and Installation	957	Diagnosis Procedure	985	
		Component Inspection	988	
		Removal and Installation	988	
DTC P2118 THROTTLE CONTROL MOTOR..	958	DTC P2A00 A/F SENSOR 1	989	H
Component Description	958	Component Description	989	
On Board Diagnosis Logic	958	CONSULT-III Reference Value in Data Monitor		I
DTC Confirmation Procedure	958	Mode	989	
Wiring Diagram	959	On Board Diagnosis Logic	989	
Diagnosis Procedure	960	DTC Confirmation Procedure	989	J
Component Inspection	961	Wiring Diagram	991	
Removal and Installation	961	Diagnosis Procedure	992	
		Removal and Installation	995	
DTC P2119 ELECTRIC THROTTLE CONTROL ACTUATOR	963	ASC D BRAKE SWITCH	996	K
Component Description	963	Component Description	996	
On Board Diagnosis Logic	963	CONSULT-III Reference Value in Data Monitor		L
DTC Confirmation Procedure	963	Mode	996	
Diagnosis Procedure	964	Wiring Diagram	997	
		Diagnosis Procedure	998	
		Component Inspection	1002	M
DTC P2122, P2123 APP SENSOR	965	ASC D INDICATOR	1004	N
Component Description	965	Component Description	1004	
CONSULT-III Reference Value in Data Monitor		CONSULT-III Reference Value in Data Monitor		
Mode	965	Mode	1004	
On Board Diagnosis Logic	965	Wiring Diagram	1005	O
DTC Confirmation Procedure	965	Diagnosis Procedure	1005	
Wiring Diagram	966			
Diagnosis Procedure	967	ELECTRICAL LOAD SIGNAL	1007	P
Component Inspection	969	CONSULT-III Reference Value in Data Monitor		
Removal and Installation	969	Mode	1007	
		Diagnosis Procedure	1007	
DTC P2127, P2128 APP SENSOR	970	FUEL INJECTOR	1009	
Component Description	970	Component Description	1009	
CONSULT-III Reference Value in Data Monitor		CONSULT-III Reference Value in Data Monitor		
Mode	970	Mode	1009	
On Board Diagnosis Logic	970			
DTC Confirmation Procedure	971			
Wiring Diagram	972			

Wiring Diagram	1010	Wiring Diagram	1029
Diagnosis Procedure	1011	Diagnosis Procedure	1030
Component Inspection	1013	Removal and Installation	1032
Removal and Installation	1013		
FUEL PUMP	1014	MIL AND DATA LINK CONNECTOR	1033
Description	1014	Wiring Diagram	1033
CONSULT-III Reference Value in Data Monitor			
Mode	1014		
Wiring Diagram	1015		
Diagnosis Procedure	1016		
Component Inspection	1018		
Removal and Installation	1018		
IGNITION SIGNAL	1019	SERVICE DATA AND SPECIFICATIONS	
Component Description	1019	(SDS)	1035
Wiring Diagram	1020	Fuel Pressure	1035
Diagnosis Procedure	1023	Idle Speed and Ignition Timing	1035
Component Inspection	1026	Calculated Load Value	1035
Removal and Installation	1027	Mass Air Flow Sensor	1035
		Intake Air Temperature Sensor	1035
		Engine Coolant Temperature Sensor	1035
		Air Fuel Ratio (A/F) Sensor 1 Heater	1036
		Heated Oxygen sensor 2 Heater	1036
		Crankshaft Position Sensor (POS)	1036
		Camshaft Position Sensor (PHASE)	1036
		Throttle Control Motor	1036
		Fuel Injector	1036
		Fuel Pump	1036
REFRIGERANT PRESSURE SENSOR	1028		
Component Description	1028		

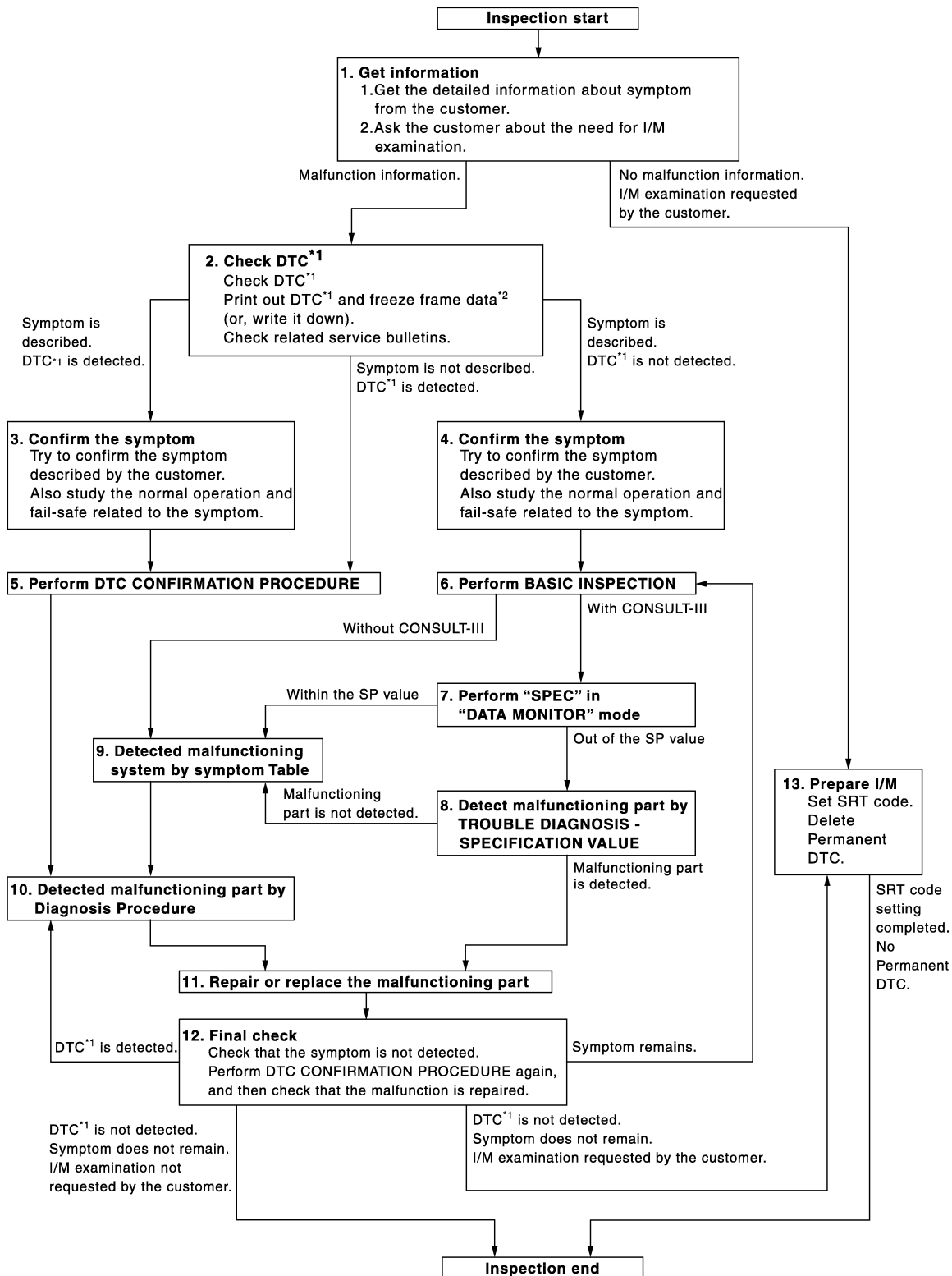
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:000000005398229

OVERALL SEQUENCE



JSBIA0067GB

DIAGNOSIS AND REPAIR WORK FLOW

[HR16DE]

< BASIC INSPECTION >

*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

DETAILED FLOW

1. GET INFORMATION FOR SYMPTOM

1. Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the "Diagnostic Work Sheet". (Refer to [EC-18, "Diagnostic Work Sheet"](#).)
2. Ask if the customer requests I/M examination.

Malfunction information, obtained>>GO TO 2.

No malfunction information, but a request for I/M examination>>GO TO 13.

2. CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is displayed.
 - Record DTC and freeze frame data. (Print them out with CONSULT-III or GST.)
 - Erase DTC. (Refer to "How to Erase DTC and 1st Trip DTC" in [EC-84, "Diagnosis Description"](#).)
 - Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to [EC-484, "Symptom Table"](#).)
3. Check related service bulletins for information.

Is any symptom described and is any DTC detected?

Symptom is described, DTC is detected>>GO TO 3.

Symptom is described, DTC is not detected>>GO TO 4.

Symptom is not described, DTC is detected>>GO TO 5.

3. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).

Also study the normal operation and fail safe related to the symptom. Refer to [EC-488, "Description"](#) and [EC-465, "Fail Safe"](#).

Diagnosis Work Sheet is useful to verify the incident.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.

Also study the normal operation and fail safe related to the symptom. Refer to [EC-488, "Description"](#) and [EC-465, "Fail Safe"](#).

Diagnosis Work Sheet is useful to verify the incident.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then make sure that DTC is detected again.

If two or more DTCs are detected, refer to [EC-467, "DTC Inspection Priority Chart"](#) and determine trouble diagnosis order.

NOTE:

- Freeze frame data is useful if the DTC is not detected.
- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.

If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIRMATION PROCEDURE.

Is DTC detected?

DIAGNOSIS AND REPAIR WORK FLOW

[HR16DE]

< BASIC INSPECTION >

YES >> GO TO 10.

NO >> Check Intermittent Incident according to [EC-114, "Diagnosis Procedure"](#).

6. PERFORM BASIC INSPECTION

Perform [EC-20, "BASIC INSPECTION : Special Repair Requirement"](#).

Do you have CONSULT-III?

YES >> GO TO 7.

NO >> GO TO 9.

7. PERFORM SPEC IN DATA MONITOR MODE

Ⓜ **With CONSULT-III**

Make sure that "MAS A/F SE-B1", "B/FUEL SCHDL" and "A/F ALPHA-B1" are within the SP value using "SPEC" of "DATA MONITOR" mode with CONSULT-III. Refer to [EC-106, "Component Function Check"](#).

Are they within the SP value?

YES >> GO TO 9.

NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to [EC-107, "Diagnosis Procedure"](#).

Is malfunctioning part detected?

YES >> GO TO 11.

NO >> GO TO 9.

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to [EC-484, "Symptom Table"](#) based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to "Circuit Inspection" in [GI-25, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

Is malfunctioning part detected?

YES >> GO TO 11.

NO >> Monitor input data from related sensors or check the voltage of related ECM terminals using CONSULT-III. Refer to [EC-454, "Reference Value"](#).

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it. Refer to "How to Erase DTC and 1st Trip DTC" in [EC-84, "Diagnosis Description"](#).

>> GO TO 12.

12. FINAL CHECK

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then make sure that the malfunction have been repaired securely.

When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 10.

YES-2 >> Symptom remains: GO TO 6.

DIAGNOSIS AND REPAIR WORK FLOW

[HR16DE]

< BASIC INSPECTION >

NO-1 >> No request for I/M examination from the customer: Before returning the vehicle to the customer, always erase unnecessary DTC in ECM and TCM (Transmission Control Module). Refer to [EC-84, "Diagnosis Description"](#).

NO-2 >> I/M examination, requested from the customer: GO TO 13.

13. PREPARE FOR I/M EXAMINATION

1. Set SRT codes. Refer to [EC-471, "How to Set SRT Code"](#).
2. Erase permanent DTCs. Refer to [EC-473, "How to Erase Permanent DTC"](#).

>> INSPECTION END

Diagnostic Work Sheet

INFOID:000000005398230

DESCRIPTION

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.

In general, each customer feels differently about an incident. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one on the WORKSHEET SAMPLE in order to organize all the information for troubleshooting. Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

KEY POINTS

WHAT Vehicle & engine model
WHEN Date, Frequencies
WHERE..... Road conditions
HOW Operating conditions,
Weather conditions,
Symptoms

SEF907L

INSPECTION AND ADJUSTMENT

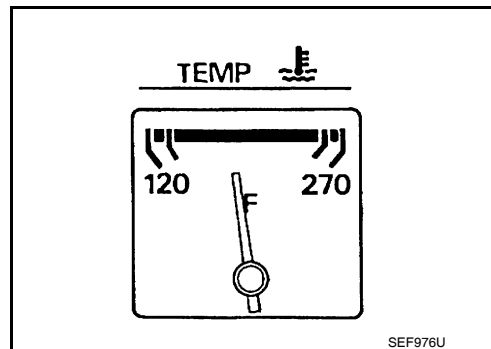
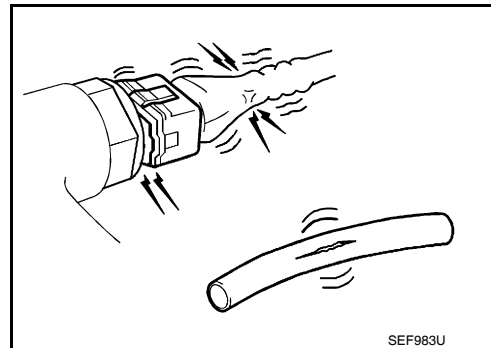
BASIC INSPECTION

BASIC INSPECTION : Special Repair Requirement

INFOID:000000005398231

1.INSPECTION START

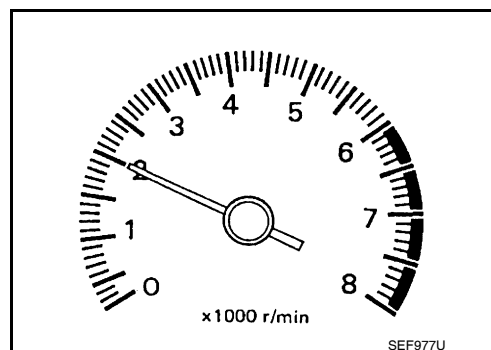
1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
 - Harness connectors for improper connections
 - Wiring harness for improper connections, pinches and cut
 - Vacuum hoses for splits, kinks and improper connections
 - Hoses and ducts for leaks
 - Air cleaner clogging
 - Gasket
3. Confirm that electrical or mechanical loads are not applied.
 - Headlamp switch is OFF.
 - Air conditioner switch is OFF.
 - Rear window defogger switch is OFF.
 - Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
Ensure engine stays below 1,000 rpm.



5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT-III or GST.

Is any DTC detected?

- YES >> GO TO 2.
NO >> GO TO 3.



2.REPAIR OR REPLACE

Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3

3.CHECK IDLE SPEED

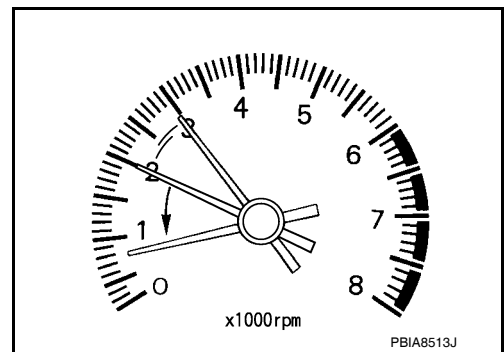
1. Run engine at about 2,000 rpm for about 2 minutes under no load.

INSPECTION AND ADJUSTMENT

[HR16DE]

< BASIC INSPECTION >

- Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
- Check idle speed.
For procedure, refer to [EC-24, "IDLE SPEED : Special Repair Requirement"](#). For specification, refer to [EC-502, "Idle Speed"](#).



Is the inspection result normal?

- YES >> GO TO 10.
NO >> GO TO 4.

4.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- Stop engine.
- Perform [EC-25, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement"](#).

>> GO TO 5.

5.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-25, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).

>> GO TO 6.

6.PERFORM IDLE AIR VOLUME LEARNING

Perform [EC-26, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"](#).

Is Idle Air Volume Learning carried out successfully?

- YES >> GO TO 7.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

7.CHECK IDLE SPEED AGAIN

- Start engine and warm it up to normal operating temperature.
- Check idle speed.
For procedure, refer to [EC-24, "IDLE SPEED : Special Repair Requirement"](#).
For specification, refer to [EC-502, "Idle Speed"](#).

Is the inspection result normal?

- YES >> GO TO 10.
NO >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the Following.

- Check camshaft position sensor (PHASE) and circuit. Refer to [EC-262, "DTC Logic"](#).
- Check crankshaft position sensor (POS) and circuit. Refer to [EC-257, "DTC Logic"](#).

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Repair or replace. Then GO TO 4.

9.CHECK ECM FUNCTION

- Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is rare.)
- Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to [BL-249, "ECM Re-communicating Function"](#).

>> GO TO 4.

10.CHECK IGNITION TIMING

- Run engine at idle.

INSPECTION AND ADJUSTMENT

[HR16DE]

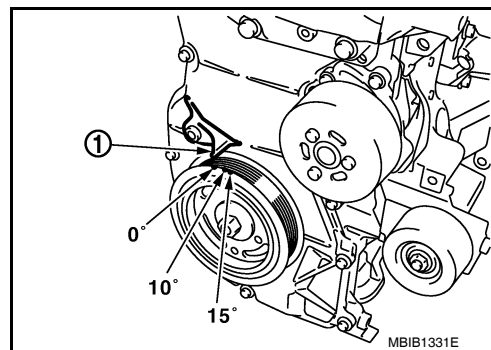
< BASIC INSPECTION >

2. Check ignition timing with a timing light.
For procedure, refer to [EC-24, "IGNITION TIMING : Special Repair Requirement"](#). For specification, refer to [EC-502, "Ignition Timing"](#).

1 : Timing indicator

Is the inspection result normal?

- YES >> GO TO 19.
NO >> GO TO 11.



11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform [EC-25, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement"](#).

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-25, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform [EC-26, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"](#).

Is Idle Air Volume Learning carried out successfully?

- YES >> GO TO 14.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

14. CHECK IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
For procedure, refer to [EC-24, "IDLE SPEED : Special Repair Requirement"](#).
For specification, refer to [EC-502, "Idle Speed"](#).

Is the inspection result normal?

- YES >> GO TO 15.
NO >> GO TO 17.

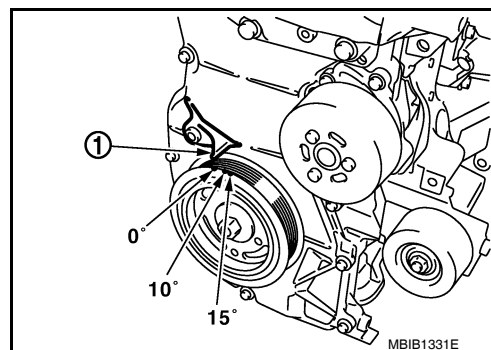
15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.
For procedure, refer to [EC-24, "IGNITION TIMING : Special Repair Requirement"](#). For specification, refer to [EC-502, "Ignition Timing"](#).

1 : Timing indicator

Is the inspection result normal?

- YES >> GO TO 19.
NO >> GO TO 16.



16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to [EM-157, "Removal and Installation"](#).

Is the inspection result normal?

- YES >> GO TO 17.
NO >> Repair the timing chain installation. Then GO TO 4.

INSPECTION AND ADJUSTMENT

< BASIC INSPECTION >

[HR16DE]

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to [EC-262, "DTC Logic"](#).
- Check crankshaft position sensor (POS) and circuit. Refer to [EC-257, "DTC Logic"](#).

Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair or replace. Then GO TO 4.

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is rare.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to [EC-23, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"](#).

>> GO TO 4.

19. INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, perform [EC-23, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"](#).

>> INSPECTION END

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description

INFOID:000000005398232

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement

INFOID:000000005398233

1. PERFORM INITIALIZATION OF NATS SYSTEM AND REGISTRATION OF ALL NATS IGNITION KEY IDS

Refer to [BL-249, "ECM Re-communicating Function"](#).

>> GO TO 2.

2. PERFORM VIN REGISTRATION

Refer to [EC-25, "VIN REGISTRATION : Special Repair Requirement"](#).

>> GO TO 3.

3. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to [EC-25, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement"](#).

>> GO TO 4.

4. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to [EC-25, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).

>> GO TO 5.

5. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-26, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"](#).

>> END

IDLE SPEED

IDLE SPEED : Description

INFOID:000000005398234

This describes how to check the idle speed. For the actual procedure, follow the instructions in "BASIC INSPECTION".

IDLE SPEED : Special Repair Requirement

INFOID:000000005398235

1. CHECK IDLE SPEED

With CONSULT-III

Check idle speed in "DATA MONITOR" mode with CONSULT-III.

With GST

Check idle speed with Service \$01 of GST.

>> INSPECTION END

IGNITION TIMING

IGNITION TIMING : Description

INFOID:000000005398236

This describes how to check the ignition timing. For the actual procedure, follow the instructions in "BASIC INSPECTION".

IGNITION TIMING : Special Repair Requirement

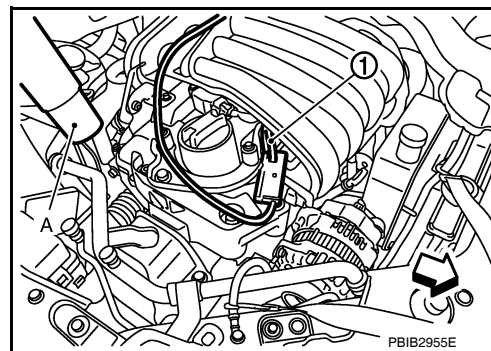
INFOID:000000005398237

1. CHECK IGNITION TIMING

1. Attach timing light to No. 1 ignition coil (1) wire as shown.

2 : Timing light

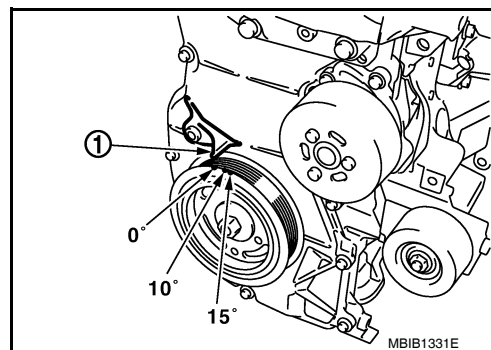
 : Vehicle front



2. Check ignition timing.

1 : Timing indicator

>> INSPECTION END



VIN REGISTRATION

VIN REGISTRATION : Description

INFOID:000000005398238

VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced.

NOTE:

Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).

VIN REGISTRATION : Special Repair Requirement

INFOID:000000005398239

1.CHECK VIN

Check the VIN of the vehicle and note it. Refer to [GI-43, "Model Variation"](#).

>> GO TO 2.

2.PERFORM VIN REGISTRATION**Ⓜ With CONSULT-III**

1. Turn ignition switch ON and engine stopped.
2. Select "VIN REGISTRATION" in "WORK SUPPORT" mode.
3. Follow the instruction of CONSULT-III display.

>> END

ACCELERATOR PEDAL RELEASED POSITION LEARNING**ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description** INFOID:000000005398240

Accelerator Pedal Released Position Learning is a function of ECM to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement

INFOID:000000005398241

1.START

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 2 seconds.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and wait at least 2 seconds.
5. Turn ignition switch OFF and wait at least 10 seconds.

>> END

THROTTLE VALVE CLOSED POSITION LEARNING**THROTTLE VALVE CLOSED POSITION LEARNING : Description** INFOID:000000005398242

Throttle Valve Closed Position Learning is a function of ECM to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement

INFOID:000000005398243

1.START

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

>> END

IDLE AIR VOLUME LEARNING**IDLE AIR VOLUME LEARNING : Description** INFOID:000000005398244

Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps each engine idle speed within the specific range. It must be performed under any of the following conditions:

INSPECTION AND ADJUSTMENT

[HR16DE]

< BASIC INSPECTION >

- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

IDLE AIR VOLUME LEARNING : Special Repair Requirement

INFOID:000000005398245

1. PRECONDITIONING

Make sure that all of the following conditions are satisfied.

Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9 V (At idle)
 - Engine coolant temperature: 70 - 100°C (158 - 212°F)
 - Selector lever: P or N (A/T), Neutral (M/T)
 - Electric load switch: OFF
(Air conditioner, headlamp, rear window defogger)
- On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is started the headlamp will not be illuminated.**
- Steering wheel: Neutral (Straight-ahead position)
 - Vehicle speed: Stopped
 - Transmission: Warmed-up
 - A/T models
 - With CONSULT-III: Drive vehicle until "FLUID TEMP SE" in "DATA MONITOR" mode of "TRANSMISSION" system indicates less than 0.9 V.
 - Without CONSULT-III: Drive vehicle for 10 minutes.
 - M/T models
 - Drive vehicle for 10 minutes.

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 3.

2. IDLE AIR VOLUME LEARNING

With CONSULT-III

1. Perform Accelerator Pedal Released Position Learning. Refer to [EC-25. "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement"](#).
2. Perform Throttle Valve Closed Position Learning. Refer to [EC-25. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).
3. Start engine and warm it up to normal operating temperature.
4. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
5. Touch "START" and wait 20 seconds.

Is "CMPLT" displayed on CONSULT-III screen?

YES >> GO TO 4.

NO >> GO TO 5.

3. IDLE AIR VOLUME LEARNING

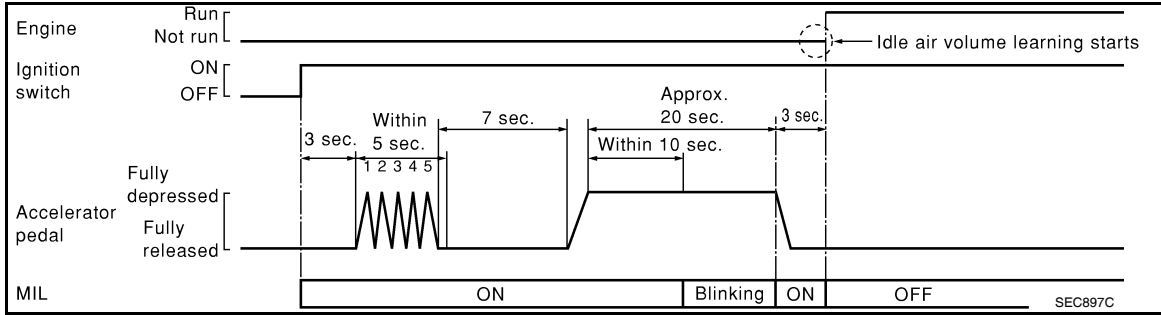
Without CONSULT-III

NOTE:

- It is better to count the time accurately with a clock.
 - It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
1. Perform Accelerator Pedal Released Position Learning. Refer to [EC-25. "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement"](#).
 2. Perform Throttle Valve Closed Position Learning. Refer to [EC-25. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).
 3. Start engine and warm it up to normal operating temperature.
 4. Turn ignition switch OFF and wait at least 10 seconds.
 5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
 6. Repeat the following procedure quickly five times within 5 seconds.
 - Fully depress the accelerator pedal.
 - Fully release the accelerator pedal.
 7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turned ON.
 8. Fully release the accelerator pedal within 3 seconds after the MIL turned ON.

< BASIC INSPECTION >

9. Start engine and let it idle.
10. Wait 20 seconds.



>> GO TO 4.

4. CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.

ITEM	SPECIFICATION
Idle speed	A/T: 700 ± 50 rpm (in P or N position) M/T: 650 ± 50 rpm (in Neutral position)
Ignition timing	A/T: 6 ± 5°BTDC (in P or N position) M/T: 6 ± 5°BTDC (in Neutral position)

Is the inspection result normal?

YES >> INSPECTION END

5. DETECT MALFUNCTIONING PART

Check the following

- Check that throttle valve is fully closed.
- Check PCV valve operation.
- Check that downstream of throttle valve is free from air leakage.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6. DETECT MALFUNCTIONING PART

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.

It is useful to perform "TROUBLE DIAGNOSIS - SPECIFICATION VALUE". Refer to [EC-106. "Description"](#).

If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning again:

- Engine stalls.
- Erroneous idle.

>> INSPECTION END

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description

INFOID:000000005398246

This describes how to erase the mixture ratio self-learning value. For the actual procedure, follow the instructions in "Diagnosis Procedure".

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement

INFOID:000000005398247

1. START

INSPECTION AND ADJUSTMENT

[HR16DE]

< BASIC INSPECTION >

 **With CONSULT-III**

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
3. Clear mixture ratio self-learning value by touching "CLEAR".

 **With GST**

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select Service \$03 with GST. Make sure DTC P0102 is detected.
7. Select Service \$04 with GST to erase the DTC P0102.

>> END

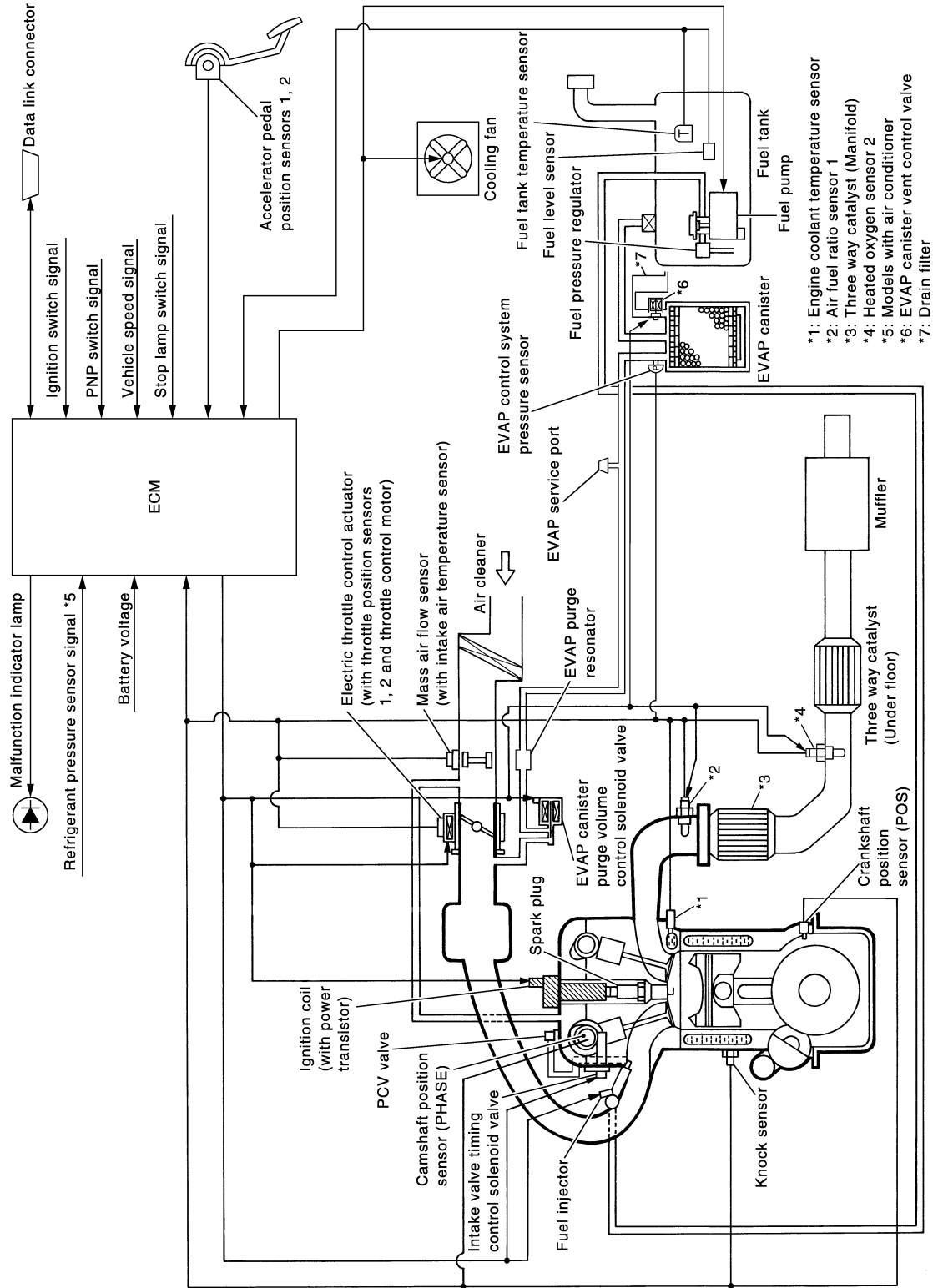
FUNCTION DIAGNOSIS

ENGINE CONTROL SYSTEM

System Diagram

INFOID:000000005398248

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P



JMBIA2191GB

ENGINE CONTROL SYSTEM

[HR16DE]

< FUNCTION DIAGNOSIS >

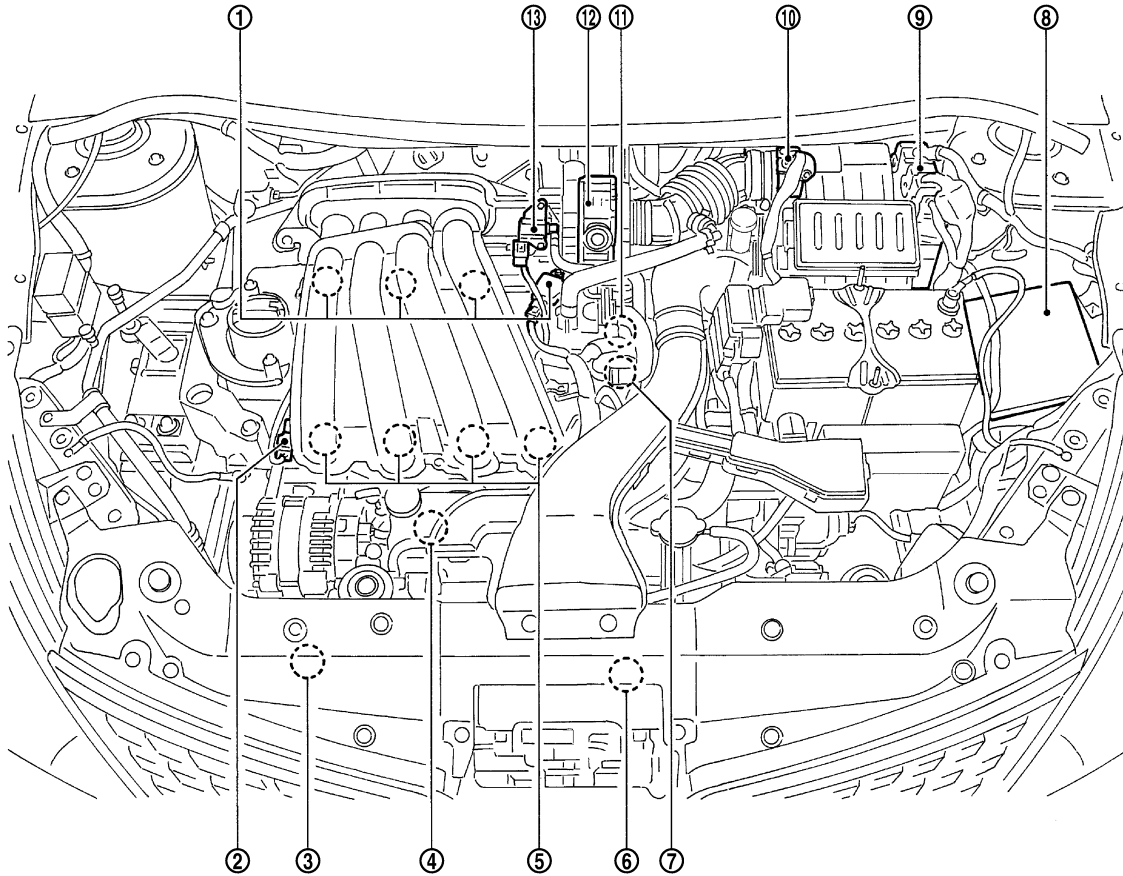
System Description

INFOID:000000005398249

ECM performs various controls such as fuel injection control and ignition timing control.

Component Parts Location

INFOID:000000005398250



PBIB2939E

- | | | |
|---|---|--|
| 1. Ignition coil (with power transistor) and spark plug | 2. Intake valve timing control solenoid valve | 3. Refrigerant pressure sensor |
| 4. Knock sensor | 5. Fuel injector | 6. Cooling fan motor |
| 7. Camshaft position sensor (PHASE) | 8. IPDM E/R | 9. ECM |
| 10. Mass air flow sensor (with intake air temperature sensor) | 11. Engine coolant temperature sensor | 12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor) |
| 13. EVAP canister purge volume control solenoid valve | | |

A

EC

C

D

E

F

G

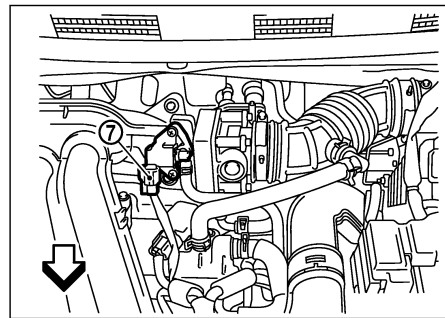
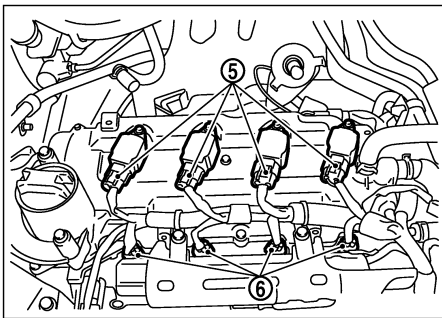
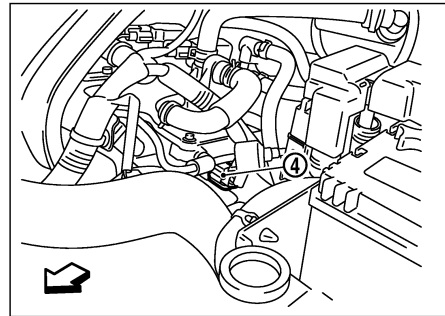
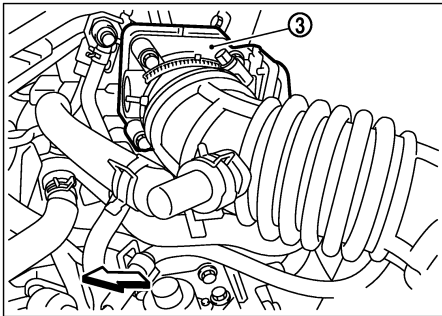
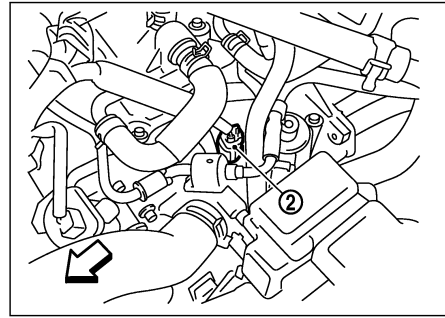
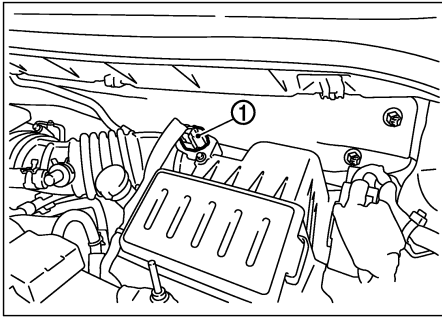
H

I

J

K

L



PBIB2940E

- | | | |
|---|--|---------------------------------------|
| 1. Mass air flow sensor
(with intake air temperature sensor) | 2. Engine coolant temperature sensor | 3. Electric throttle control actuator |
| 4. Camshaft position sensor (PHASE) | 5. Ignition coil (with power transistor) | 6. Fuel injector |
| 7. EVAP canister purge volume control
solenoid valve | | |

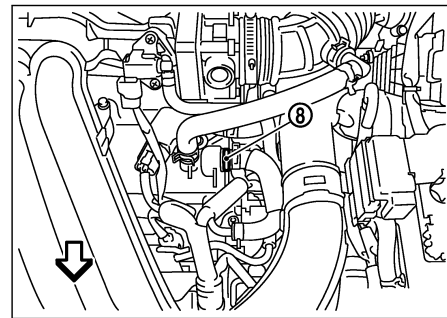
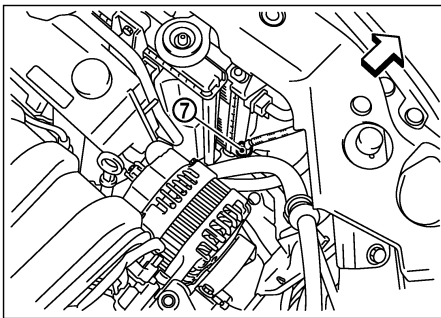
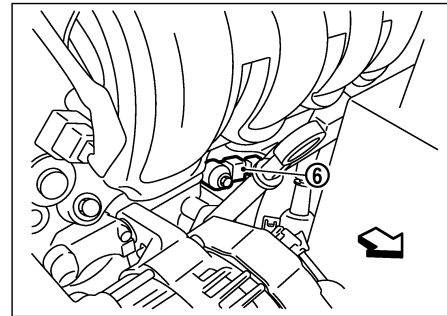
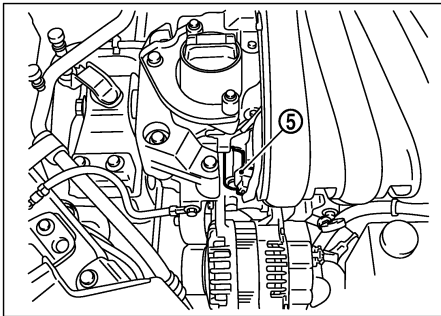
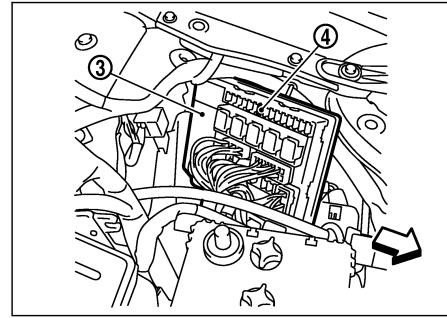
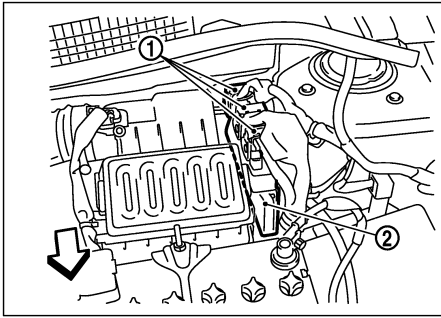
↶ Vehicle front

M

N

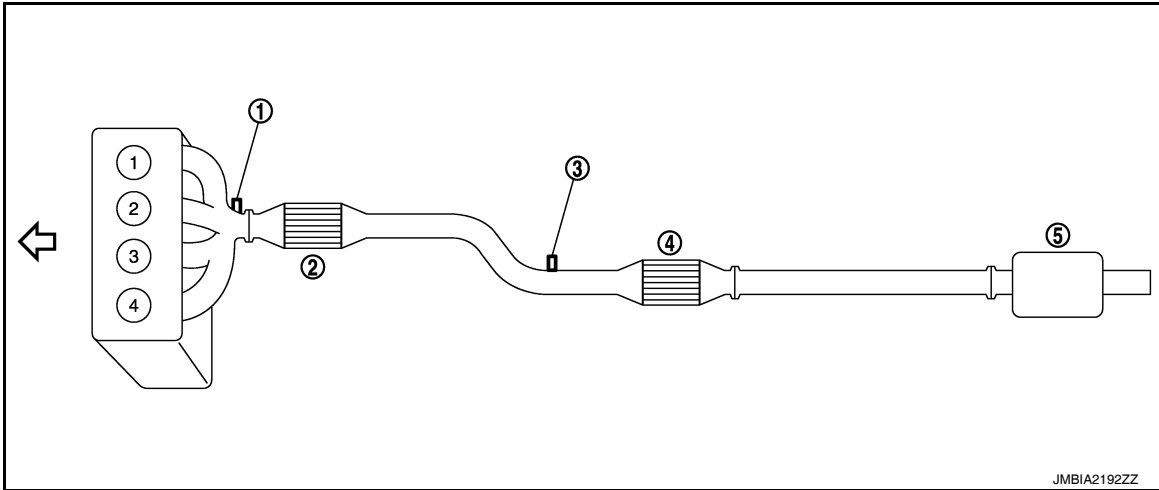
O

P

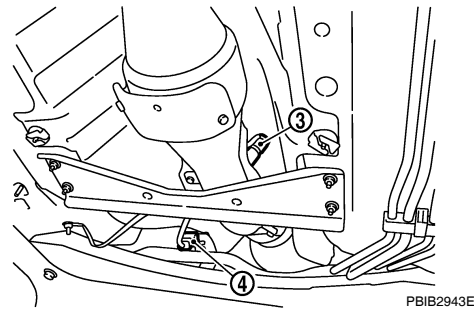
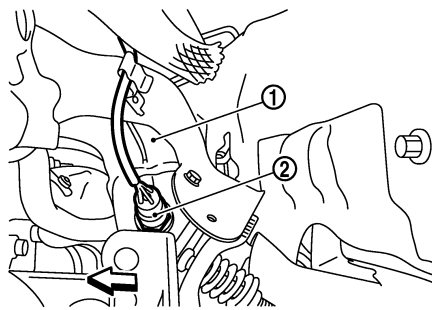


PBIB2941E

- | | | |
|--------------------------------|---|-----------------|
| 1. ECM harness connectors | 2. ECM | 3. IPDM E/R |
| 4. Fuel pump fuse (15A) | 5. Intake valve timing control solenoid valve | 6. Knock sensor |
| 7. Refrigerant pressure sensor | 8. PCV valve | |
- ↙ Vehicle front



- | | | |
|-------------------------------------|----------------------------------|---------------------------|
| 1. Air fuel ratio (A/F) sensor 1 | 2. Three way catalyst (Manifold) | 3. Heated oxygen sensor 2 |
| 4. Three way catalyst (Under floor) | 5. Muffler | |
- ← Vehicle front



- | | | |
|---|----------------------------------|---------------------------|
| 1. Exhaust manifold | 2. Air fuel ratio (A/F) sensor 1 | 3. Heated oxygen sensor 2 |
| 4. Heated oxygen sensor 2 harness connector | | |
- ← Vehicle front

A

EC

C

D

E

F

G

H

I

J

K

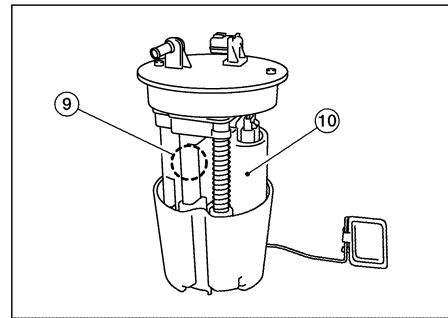
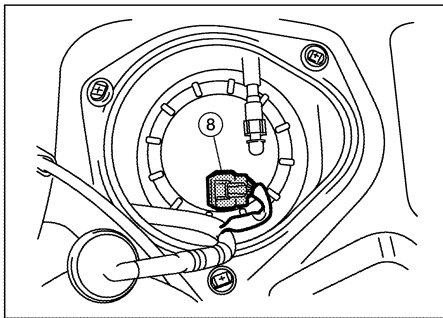
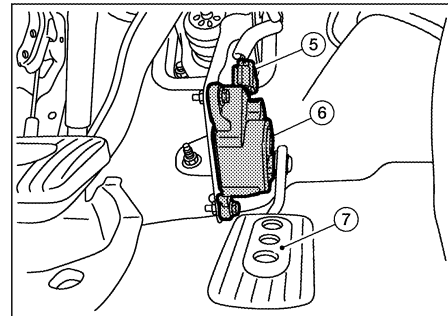
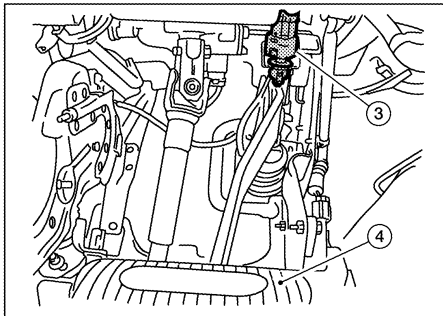
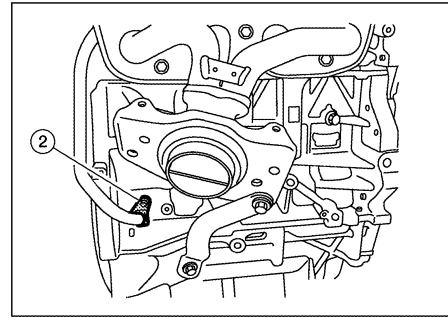
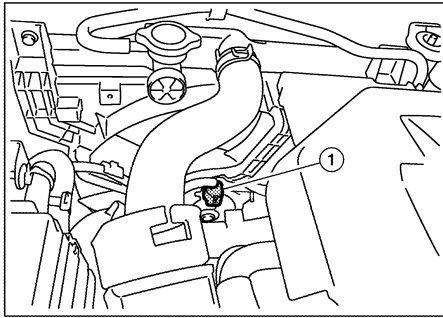
L

M

N

O

P



AWBIA0044ZZ

- | | | |
|--|---|--------------------------------------|
| 1. Cooling fan motor harness connector | 2. Crankshaft position sensor | 3. Stop lamp switch |
| 4. Brake pedal | 5. Accelerator pedal position sensor harness connector | 6. Accelerator pedal position sensor |
| 7. Accelerator pedal | 8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed) | 9. Fuel pressure regulator |
| 10. Fuel pump | | |

Component Description

INFOID:000000005398251

Component	Reference
A/F sensor 1	EC-176. "Description"
A/F sensor 1 heater	EC-130. "Description"
Accelerator pedal position sensor	EC-392. "Description"
Camshaft position sensor (PHASE)	EC-262. "Description"

ENGINE CONTROL SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]

Component	Reference
Crankshaft position sensor (POS)	EC-257, "Description"
Cooling fan motor	EC-60, "System Description"
Electric throttle control actuator	EC-390, "Description"
Engine coolant temperature sensor	EC-161, "Description"
EVAP canister purge volume control solenoid valve	EC-285, "Description"
EVAP canister vent control valve	EC-295, "Description"
EVAP control system pressure sensor	EC-306, "Description"
Fuel injector	EC-423, "Description"
Fuel level sensor	EC-336, "Description"
Fuel pump	EC-427, "Description"
Fuel tank temperature sensor	EC-234, "Description"
Heated oxygen sensor 2	EC-198, "Description"
Heated oxygen sensor 2 heater	EC-134, "Description"
Ignition signal	EC-432, "Description"
Intake air temperature sensor	EC-156, "Description"
Intake valve timing control solenoid valve	EC-78, "System Description"
Knock sensor	EC-253, "Description"
Mass air flow sensor	EC-142, "Description"
PCV valve	EC-449, "Description"
Refrigerant pressure sensor	EC-450, "Description"
Stop lamp switch	EC-373, "Description"
Throttle control motor	EC-386, "Description"
Throttle control motor relay	EC-377, "Description"
Throttle position sensor	EC-165, "Description"

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

MULTIPOINT FUEL INJECTION SYSTEM

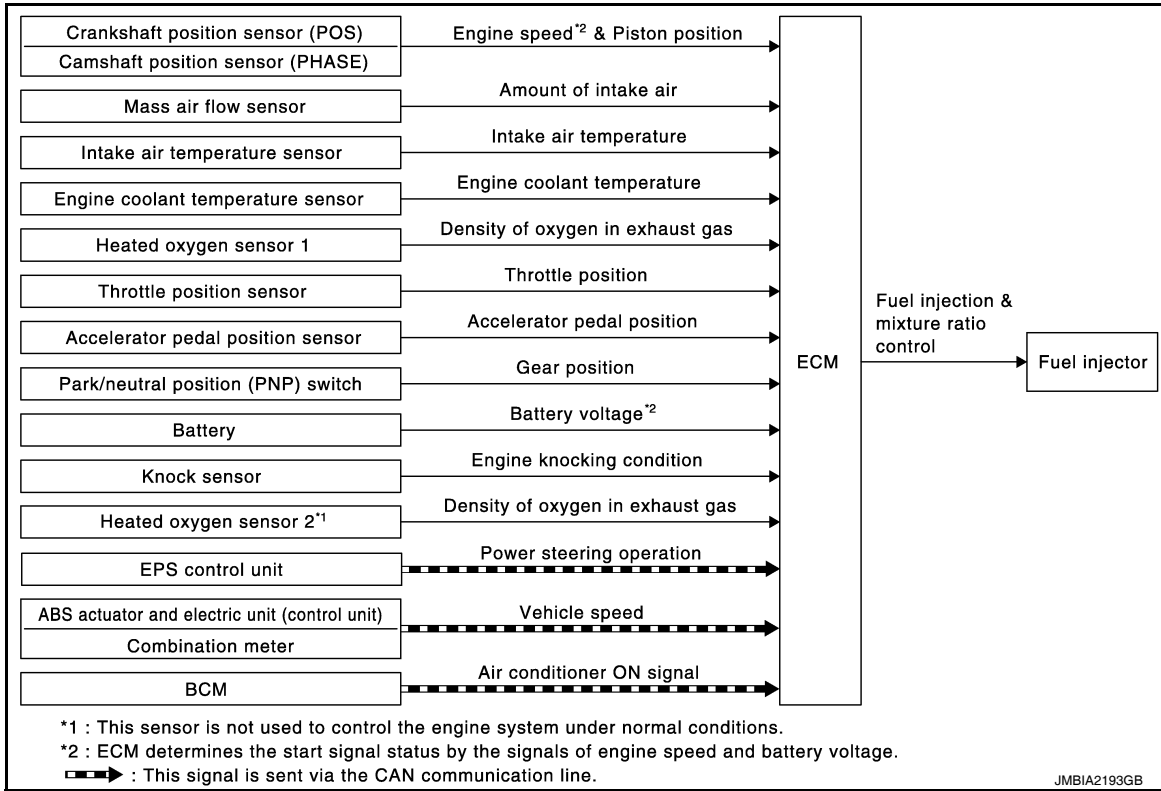
< FUNCTION DIAGNOSIS >

[HR16DE]

MULTIPOINT FUEL INJECTION SYSTEM

System Diagram

INFOID:000000005398252



System Description

INFOID:000000005398253

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*3	Fuel injection & mixture ratio control	Fuel injector
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air		
Intake air temperature sensor	Intake air temperature		
Engine coolant temperature sensor	Engine coolant temperature		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch (M/T) Transmission range switch (A/T)	Gear position		
Battery	Battery voltage*3		
Knock sensor	Engine knocking condition		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
EPS control unit	Power steering operation*2		
ABS actuator and electric unit (control unit) Combination meter	Vehicle speed*2		
BCM	Air conditioner ON signal*2		

*1: This sensor is not used to control the engine system under normal conditions.

MULTIPOINT FUEL INJECTION SYSTEM

[HR16DE]

< FUNCTION DIAGNOSIS >

*2: This signal is sent to the ECM via the CAN communication line.

*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from the crankshaft position sensor (POS), camshaft position sensor (PHASE) and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

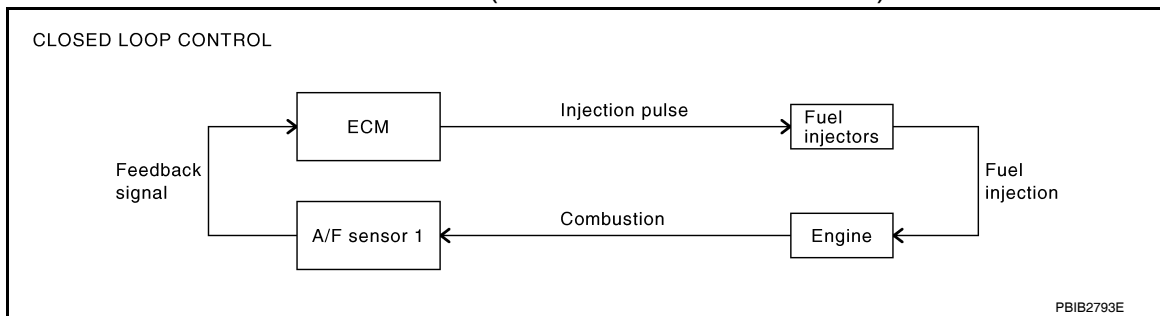
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (A/T models)
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can better reduce CO, HC and NOx emissions. This system uses A/F sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about A/F sensor 1, refer to [EC-176. "Description"](#). This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

This stage is referred to as the closed loop control condition.

Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of A/F sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

• Open Loop Control

The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of A/F sensor 1 or its circuit
- Insufficient activation of A/F sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (A/T models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from A/F sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally

MULTIPOINT FUEL INJECTION SYSTEM

[HR16DE]

< FUNCTION DIAGNOSIS >

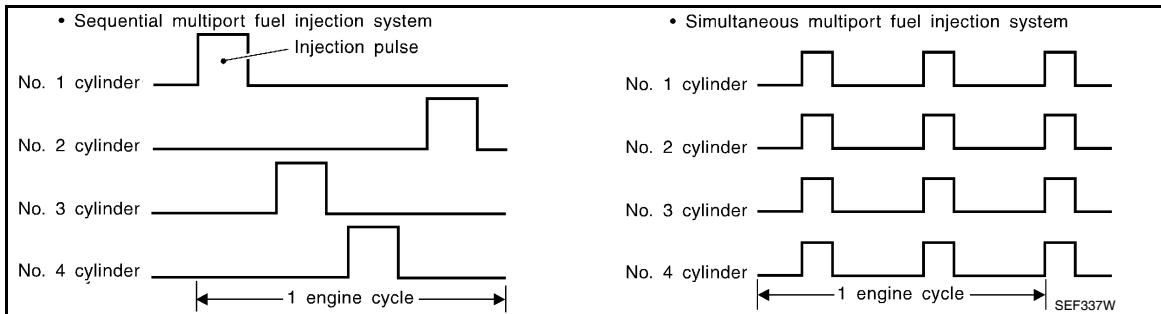
designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio. Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short-term fuel trim and long-term fuel trim.

"Short-term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from A/F sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

"Long-term fuel trim" is overall fuel compensation carried out over time to compensate for continual deviation of the short-term fuel trim from the central value. Continual deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



Two types of systems are used.

- Sequential Multiport Fuel Injection System
Fuel is injected into each cylinder during each engine cycle according to the ignition order. This system is used when the engine is running.
- Simultaneous Multiport Fuel Injection System
Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The four injectors will then receive the signals two times for each engine cycle.
This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

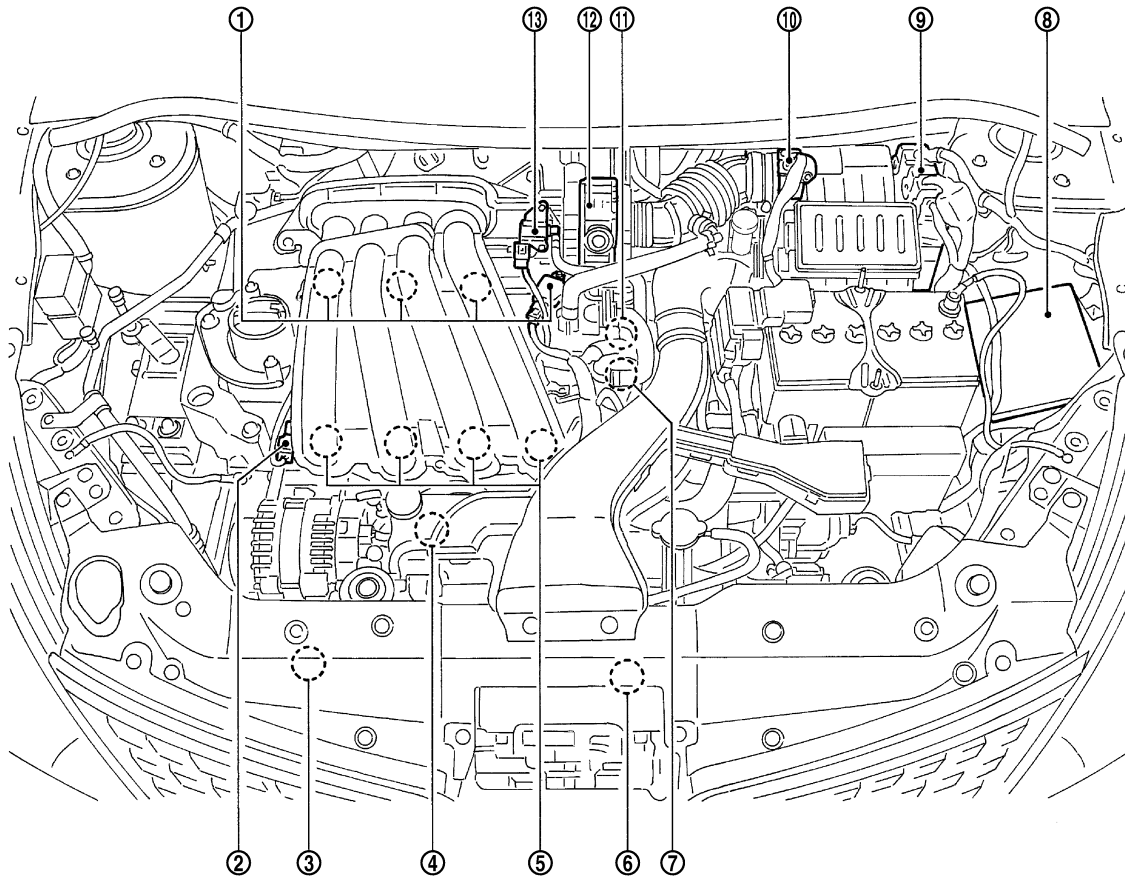
MULTIPOINT FUEL INJECTION SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]

Component Parts Location

INFOID:000000005398254



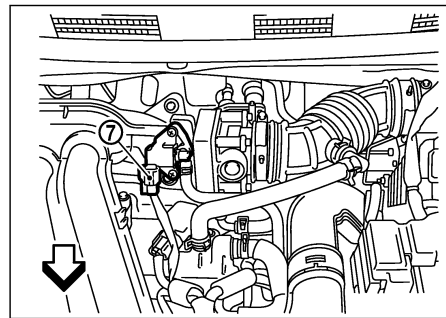
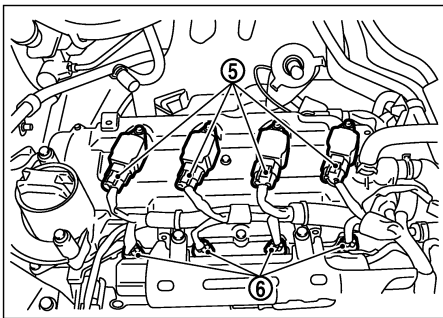
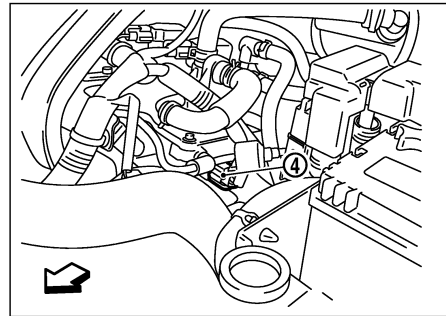
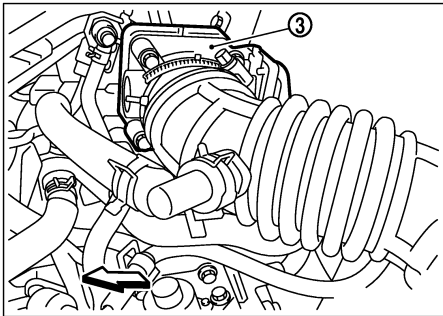
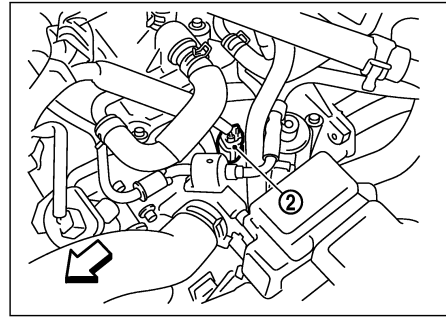
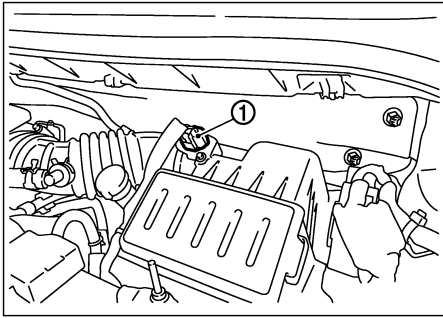
PBIB2939E

- | | | |
|---|---|--|
| 1. Ignition coil (with power transistor) and spark plug | 2. Intake valve timing control solenoid valve | 3. Refrigerant pressure sensor |
| 4. Knock sensor | 5. Fuel injector | 6. Cooling fan motor |
| 7. Camshaft position sensor (PHASE) | 8. IPDM E/R | 9. ECM |
| 10. Mass air flow sensor (with intake air temperature sensor) | 11. Engine coolant temperature sensor | 12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor) |
| 13. EVAP canister purge volume control solenoid valve | | |

MULTIPOINT FUEL INJECTION SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]



PBIB2940E

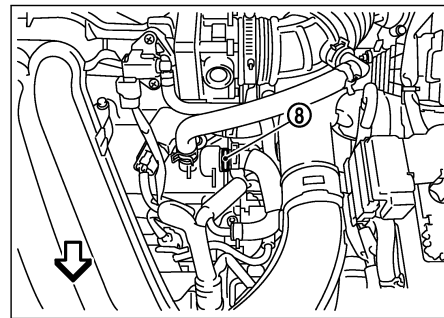
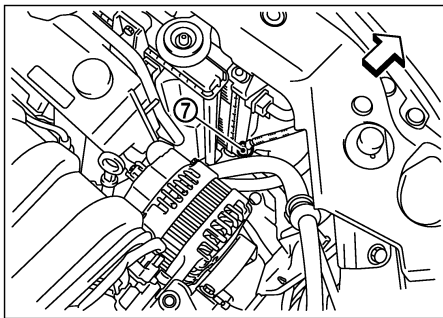
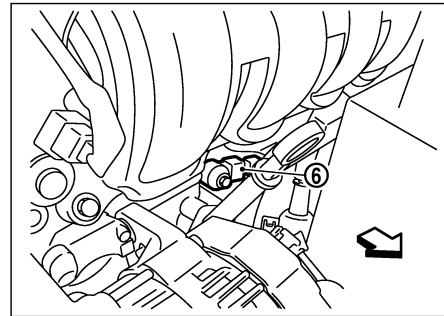
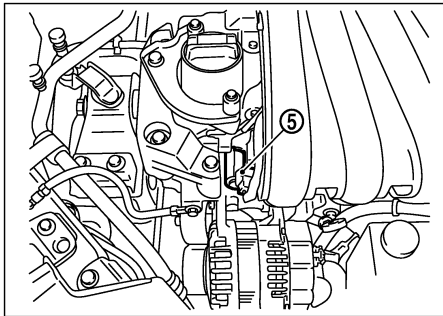
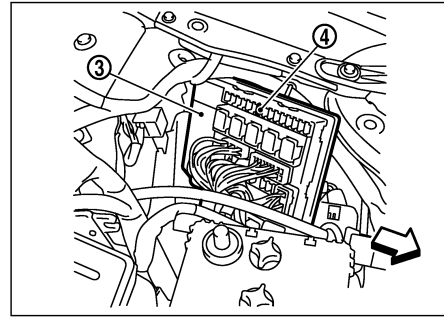
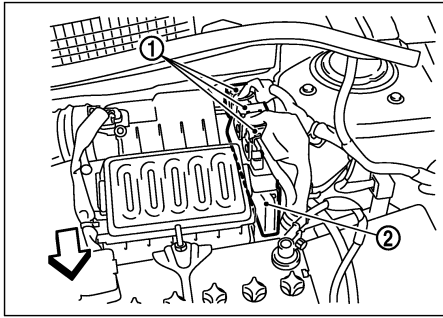
- | | | |
|---|--|---------------------------------------|
| 1. Mass air flow sensor
(with intake air temperature sensor) | 2. Engine coolant temperature sensor | 3. Electric throttle control actuator |
| 4. Camshaft position sensor (PHASE) | 5. Ignition coil (with power transistor) | 6. Fuel injector |
| 7. EVAP canister purge volume control
solenoid valve | | |

↶ Vehicle front

MULTIPOINT FUEL INJECTION SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]



- | | | |
|--------------------------------|---|-----------------|
| 1. ECM harness connectors | 2. ECM | 3. IPDM E/R |
| 4. Fuel pump fuse (15A) | 5. Intake valve timing control solenoid valve | 6. Knock sensor |
| 7. Refrigerant pressure sensor | 8. PCV valve | |
- ↶ Vehicle front

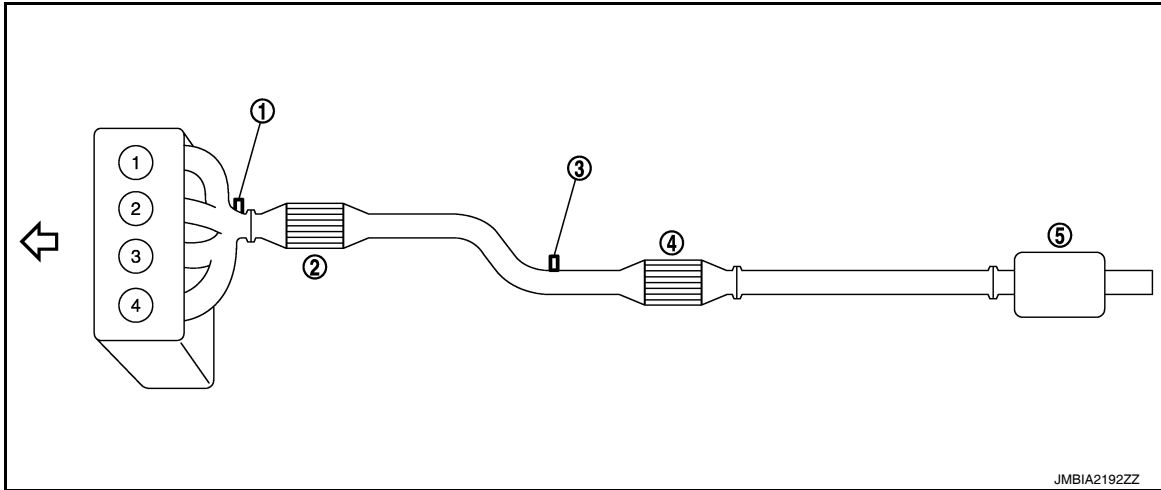
PBIB2941E

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

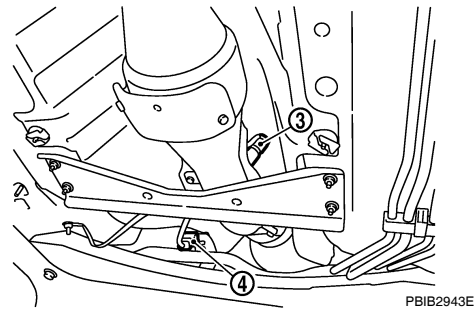
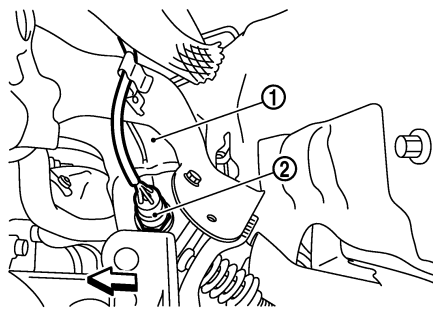
MULTIPOINT FUEL INJECTION SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]



- | | | |
|-------------------------------------|----------------------------------|---------------------------|
| 1. Air fuel ratio (A/F) sensor 1 | 2. Three way catalyst (Manifold) | 3. Heated oxygen sensor 2 |
| 4. Three way catalyst (Under floor) | 5. Muffler | |
- ⇐ Vehicle front



- | | | |
|---|----------------------------------|---------------------------|
| 1. Exhaust manifold | 2. Air fuel ratio (A/F) sensor 1 | 3. Heated oxygen sensor 2 |
| 4. Heated oxygen sensor 2 harness connector | | |
- ⇐ Vehicle front

MULTIPOINT FUEL INJECTION SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]

A

EC

C

D

E

F

G

H

I

J

K

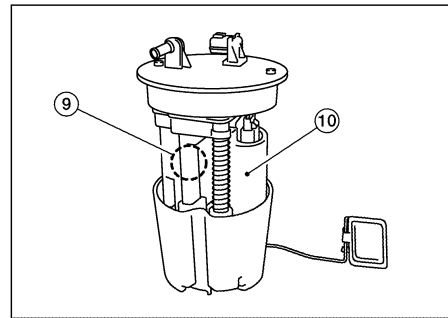
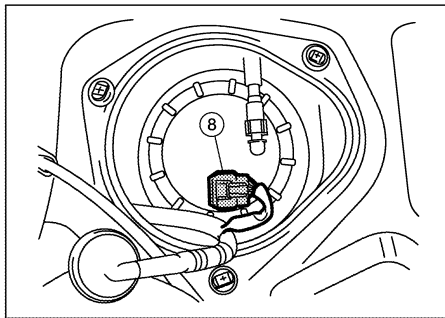
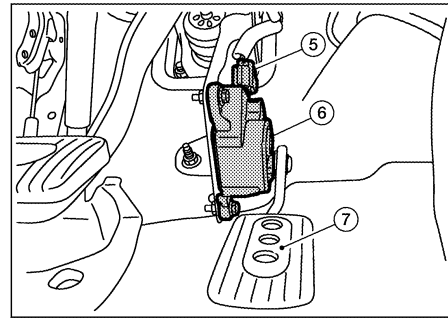
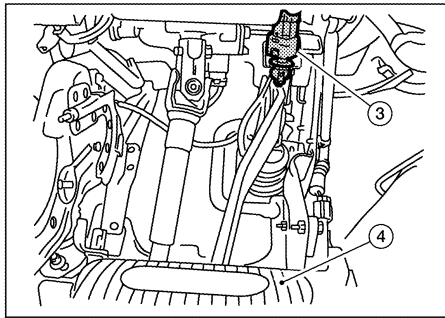
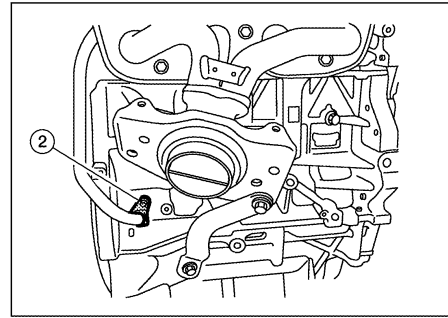
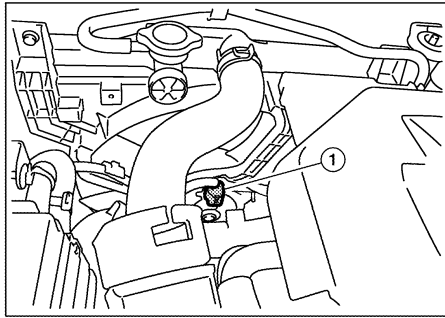
L

M

N

O

P



- 1. Cooling fan motor harness connector
- 4. Brake pedal
- 7. Accelerator pedal

- 2. Crankshaft position sensor
- 3. Stop lamp switch
- 5. Accelerator pedal position sensor harness connector
- 6. Accelerator pedal position sensor
- 8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)

- 9. Fuel pressure regulator
- 10. Fuel pump

AWBIA0044ZZ

Component Description

INFOID:000000005398255

Component	Reference
A/F sensor 1	EC-176. "Description"
Accelerator pedal position sensor	EC-392. "Description"
Camshaft position sensor (PHASE)	EC-262. "Description"
Crankshaft position sensor (POS)	EC-257. "Description"

MULTIPOINT FUEL INJECTION SYSTEM

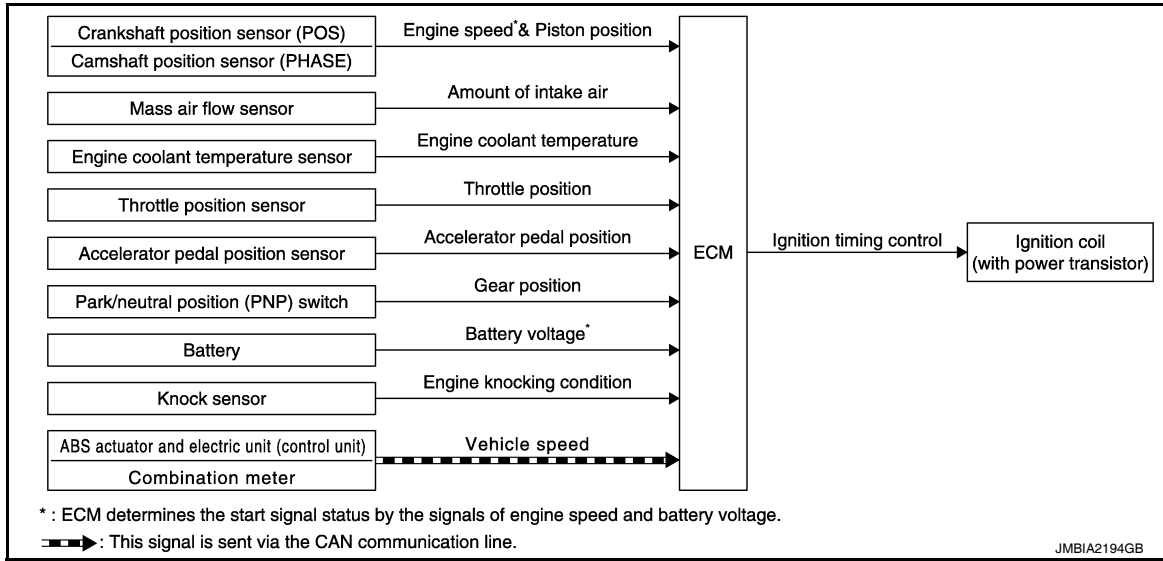
[HR16DE]

< FUNCTION DIAGNOSIS >

Component	Reference
Engine coolant temperature sensor	EC-161. "Description"
Fuel injector	EC-423. "Description"
Heated oxygen sensor 2	EC-198. "Description"
Intake air temperature sensor	EC-156. "Description"
Knock sensor	EC-253. "Description"
Mass air flow sensor	EC-142. "Description"
Throttle position sensor	EC-165. "Description"

ELECTRIC IGNITION SYSTEM

System Diagram



System Description

INFOID:000000005398257

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2 Piston position	Ignition timing control	Ignition coil (with power transistor)
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*2		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch (M/T) Transmission range switch (A/T)	Gear position		
ABS actuator and electric unit (control unit)	Vehicle speed*1		
Combination meter			

*1: This signal is sent to the ECM via the CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

Ignition order: 1 - 3 - 4 - 2

The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.

The ECM receives information such as the injection pulse width and camshaft position sensor (PHASE) signal. Computing this information, ignition signals are transmitted to the power transistor.

During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

ELECTRIC IGNITION SYSTEM

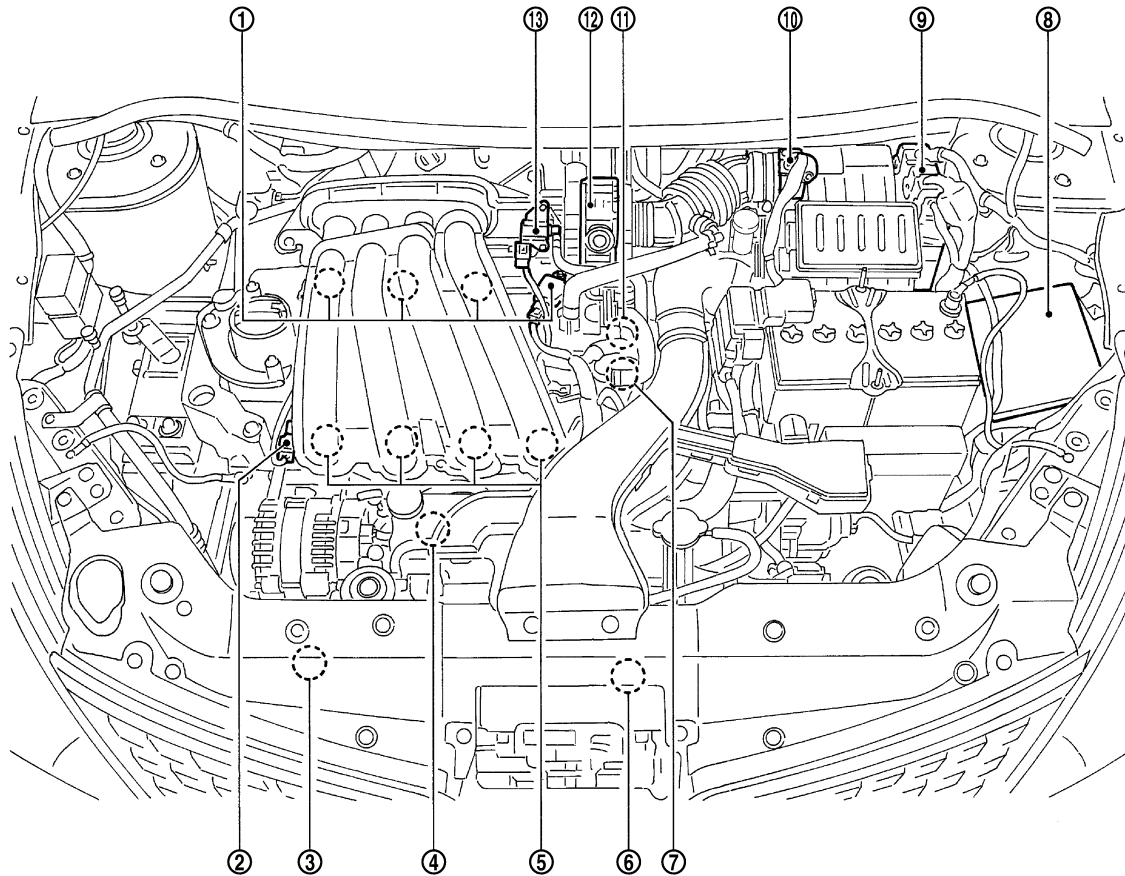
[HR16DE]

< FUNCTION DIAGNOSIS >

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Component Parts Location

INFOID:000000005398258



PBIB2939E

- | | | |
|---|---|--|
| 1. Ignition coil (with power transistor) and spark plug | 2. Intake valve timing control solenoid valve | 3. Refrigerant pressure sensor |
| 4. Knock sensor | 5. Fuel injector | 6. Cooling fan motor |
| 7. Camshaft position sensor (PHASE) | 8. IPDM E/R | 9. ECM |
| 10. Mass air flow sensor (with intake air temperature sensor) | 11. Engine coolant temperature sensor | 12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor) |
| 13. EVAP canister purge volume control solenoid valve | | |

ELECTRIC IGNITION SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]

A

EC

C

D

E

F

G

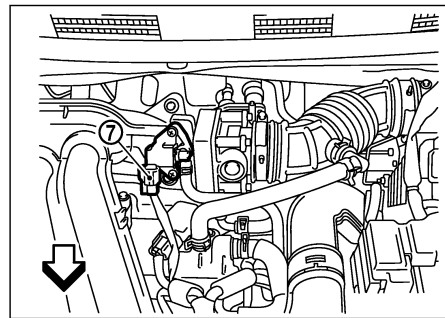
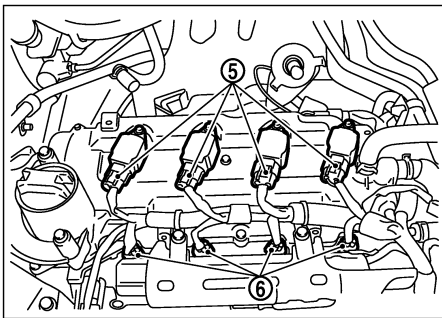
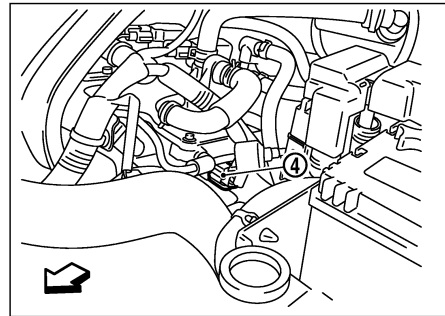
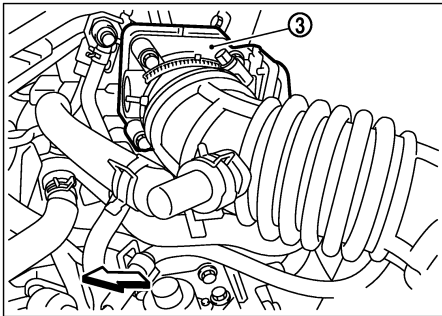
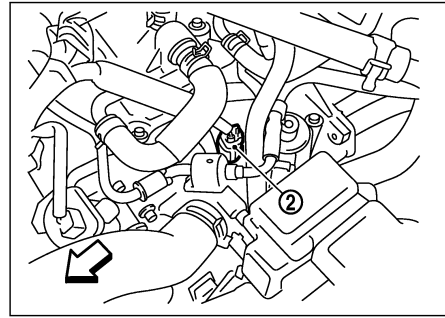
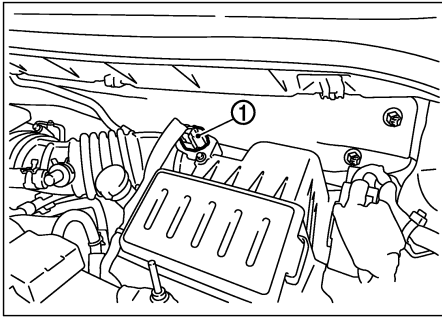
H

I

J

K

L



PBIB2940E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Camshaft position sensor (PHASE)
5. Ignition coil (with power transistor)
6. Fuel injector
7. EVAP canister purge volume control solenoid valve

← Vehicle front

M

N

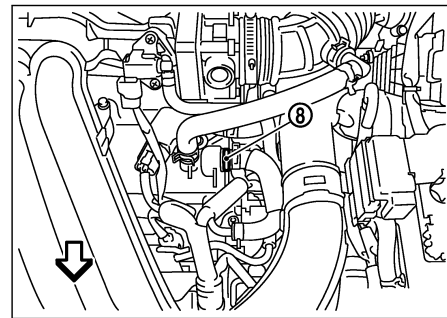
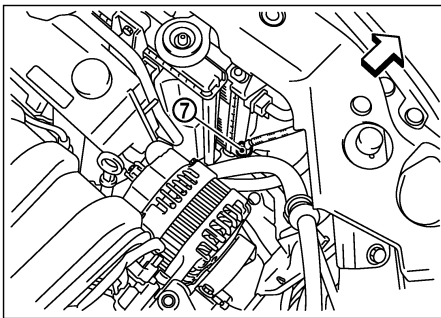
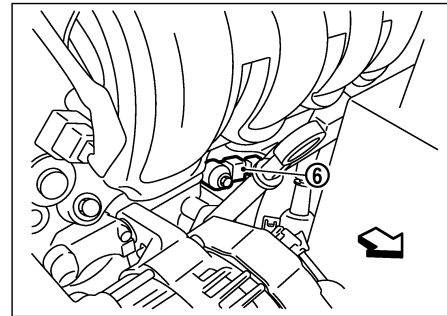
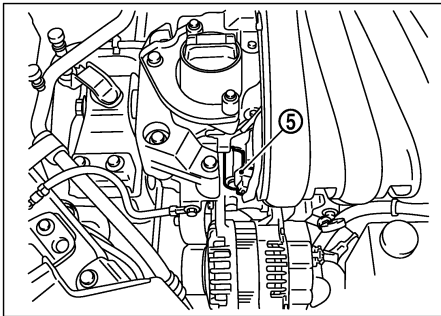
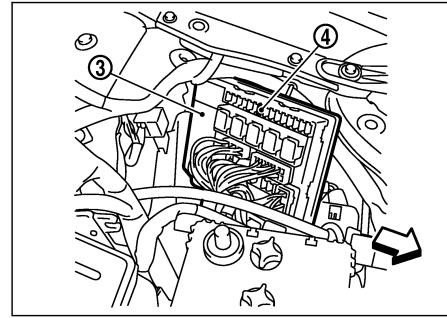
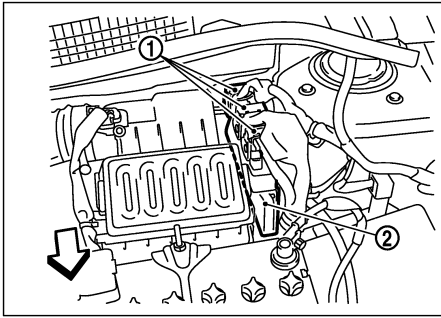
O

P

ELECTRIC IGNITION SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]



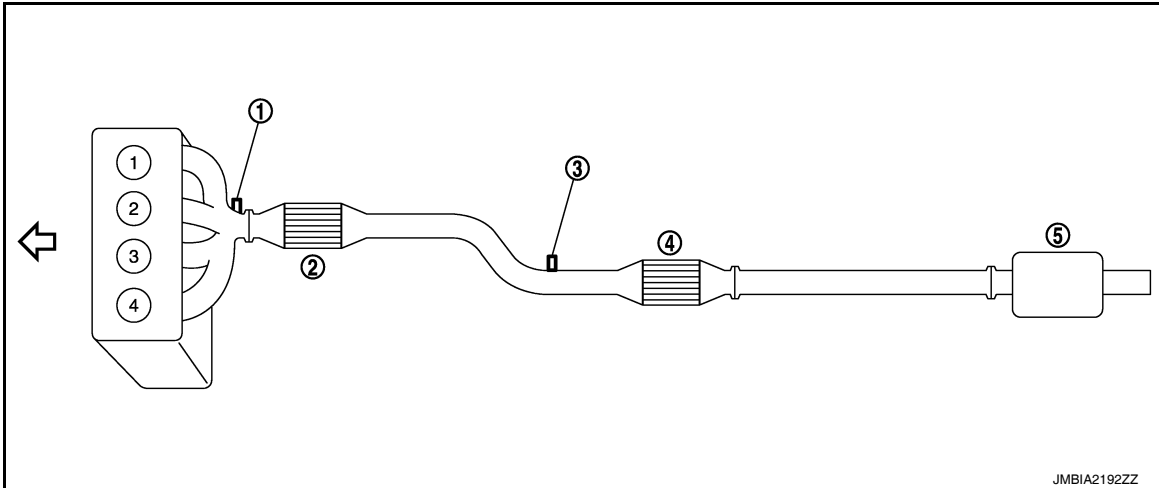
- | | | |
|--------------------------------|---|-----------------|
| 1. ECM harness connectors | 2. ECM | 3. IPDM E/R |
| 4. Fuel pump fuse (15A) | 5. Intake valve timing control solenoid valve | 6. Knock sensor |
| 7. Refrigerant pressure sensor | 8. PCV valve | |
- ← Vehicle front

PBIB2941E

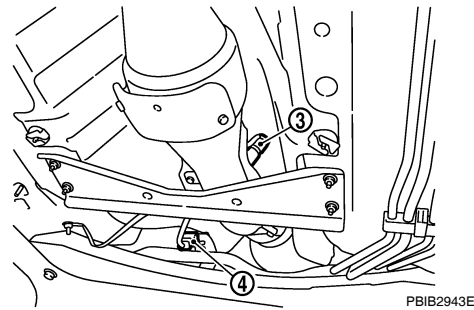
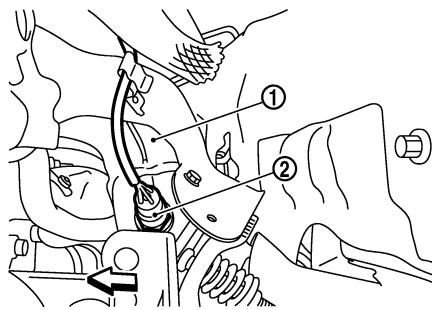
ELECTRIC IGNITION SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]

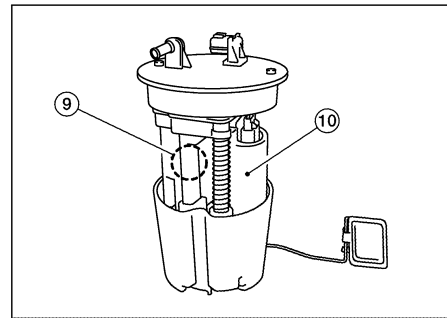
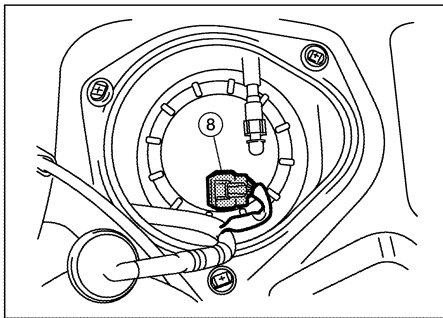
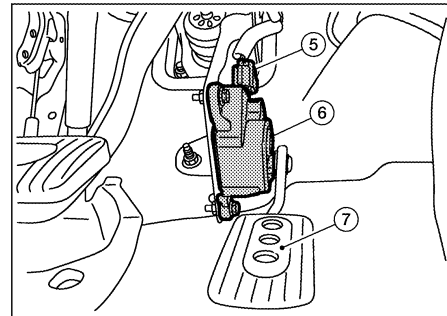
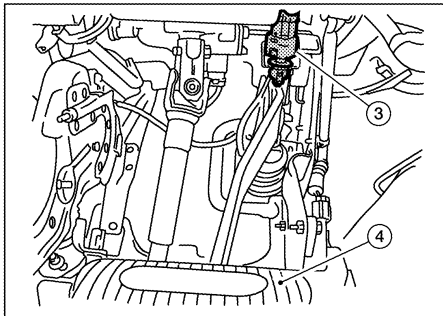
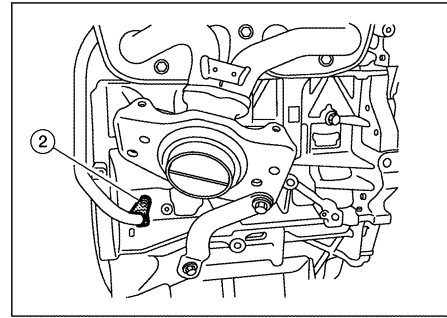
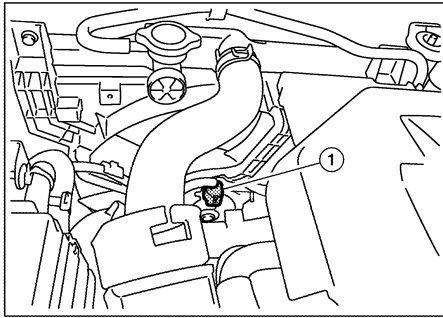


- | | | |
|-------------------------------------|----------------------------------|---------------------------|
| 1. Air fuel ratio (A/F) sensor 1 | 2. Three way catalyst (Manifold) | 3. Heated oxygen sensor 2 |
| 4. Three way catalyst (Under floor) | 5. Muffler | |
- ← Vehicle front



- | | | |
|---|----------------------------------|---------------------------|
| 1. Exhaust manifold | 2. Air fuel ratio (A/F) sensor 1 | 3. Heated oxygen sensor 2 |
| 4. Heated oxygen sensor 2 harness connector | | |
- ← Vehicle front

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P



- | | | |
|--|---|--------------------------------------|
| 1. Cooling fan motor harness connector | 2. Crankshaft position sensor | 3. Stop lamp switch |
| 4. Brake pedal | 5. Accelerator pedal position sensor harness connector | 6. Accelerator pedal position sensor |
| 7. Accelerator pedal | 8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed) | 9. Fuel pressure regulator |
| 10. Fuel pump | | |

AWBIA0044ZZ

Component Description

INFOID:000000005398259

Component	Reference
Accelerator pedal position sensor	EC-392, "Description"
Camshaft position sensor (PHASE)	EC-262, "Description"
Crankshaft position sensor (POS)	EC-257, "Description"
Engine coolant temperature sensor	EC-161, "Description"

ELECTRIC IGNITION SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]

Component	Reference	
Ignition signal	EC-432. "Description"	A
Knock sensor	EC-253. "Description"	
Mass air flow sensor	EC-142. "Description"	EC
Throttle position sensor	EC-165. "Description"	
Vehicle speed sensor	EC-341. "Description"	C

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

AIR CONDITIONING CUT CONTROL

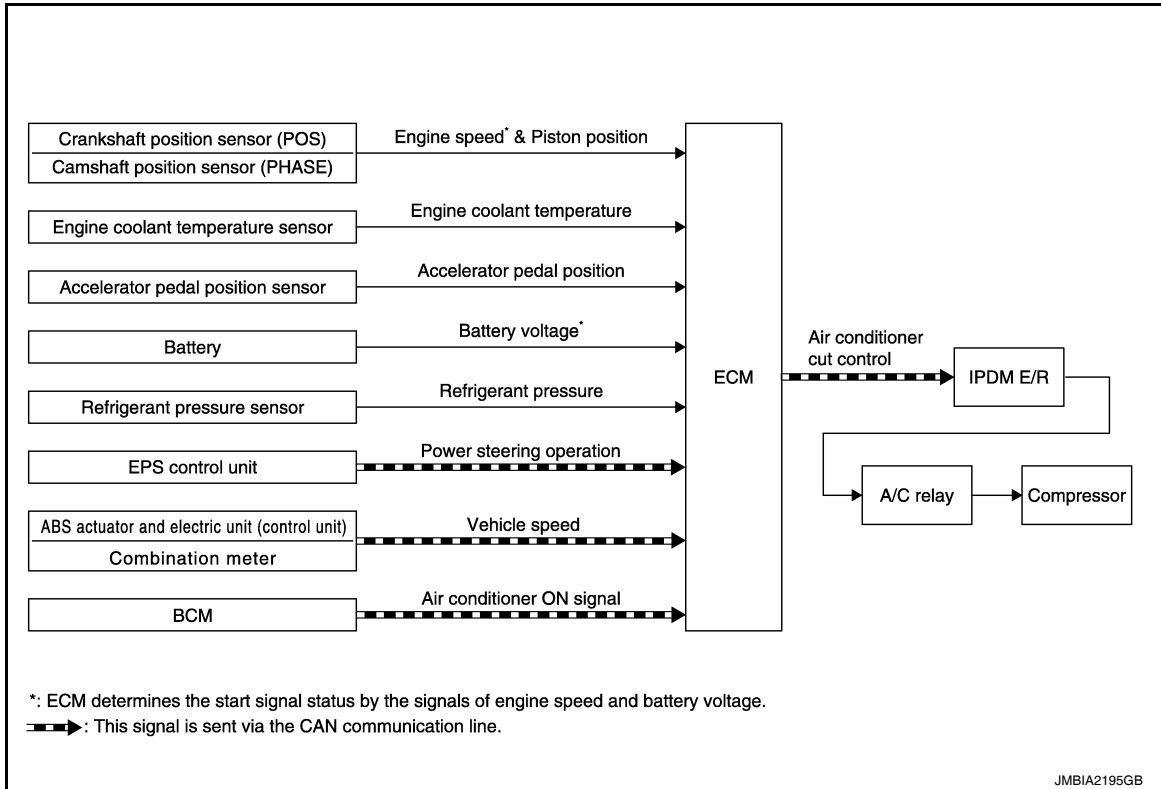
< FUNCTION DIAGNOSIS >

[HR16DE]

AIR CONDITIONING CUT CONTROL

System Diagram

INFOID:000000005398260



System Description

INFOID:000000005398261

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch*1	Air conditioner ON signal	Air conditioner cut control	IPDM E/R ↓ Air conditioner relay ↓ Compressor
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*2		
Refrigerant pressure sensor	Refrigerant pressure		
EPS control unit	Power steering operation		
ABS actuator and electric unit (control unit) Combination meter	Vehicle speed*1		
BCM	Air conditioner ON signal*1		

*1: This signal is sent to the ECM via the CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

This system improves engine operation when the air conditioner is used.

Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.

AIR CONDITIONING CUT CONTROL

[HR16DE]

< FUNCTION DIAGNOSIS >

- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

Component Parts Location

INFOID:000000005398262

A

EC

C

D

E

F

G

H

I

J

K

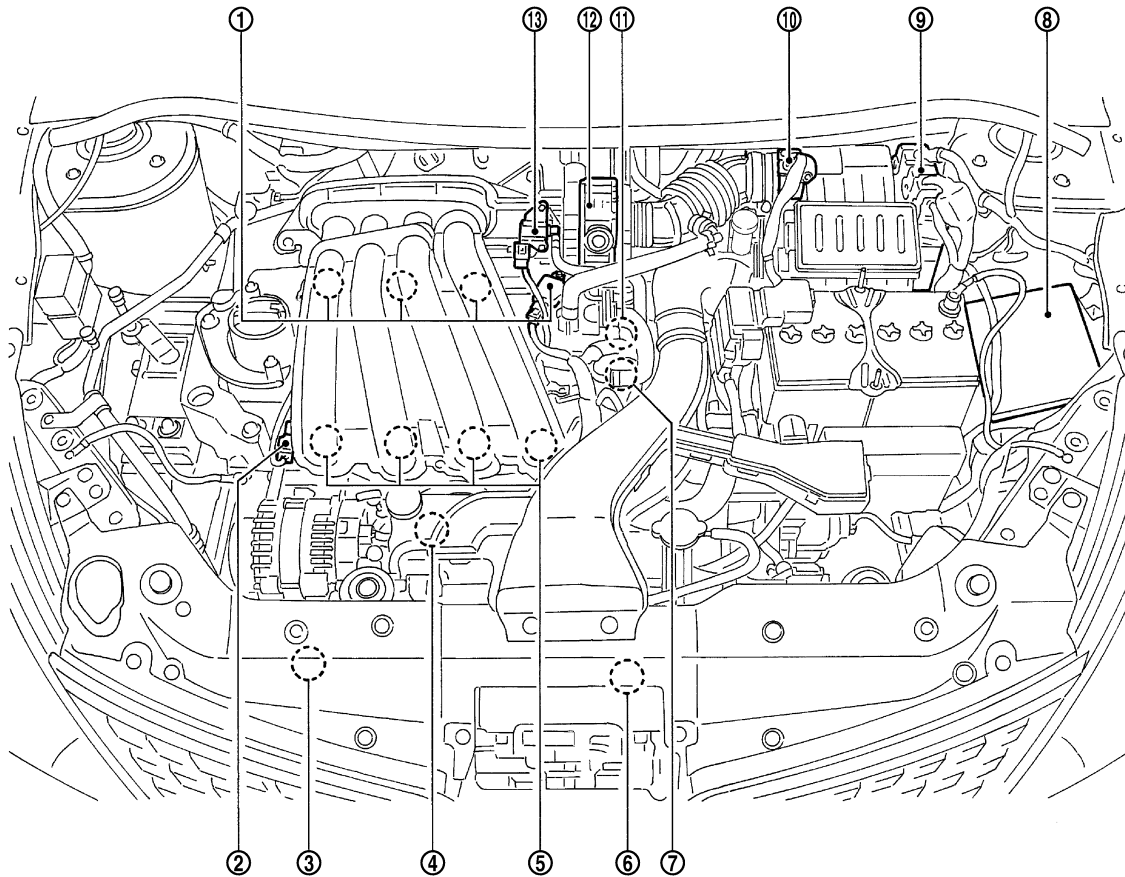
L

M

N

O

P



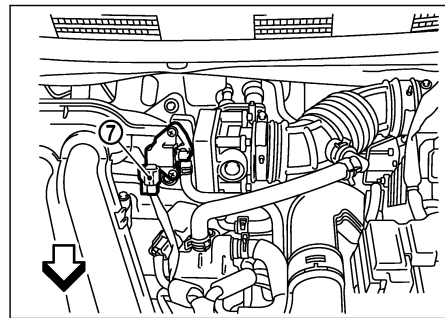
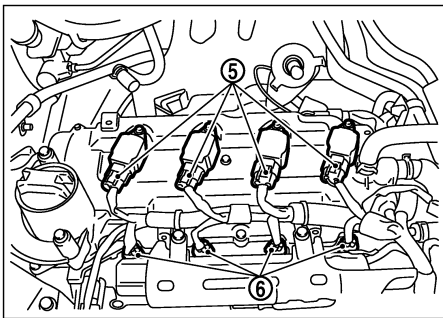
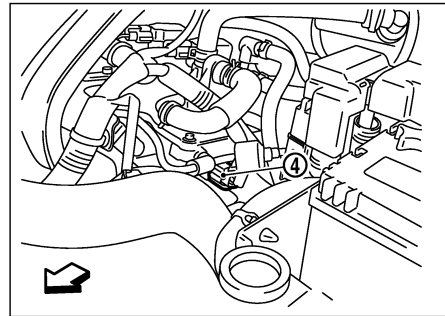
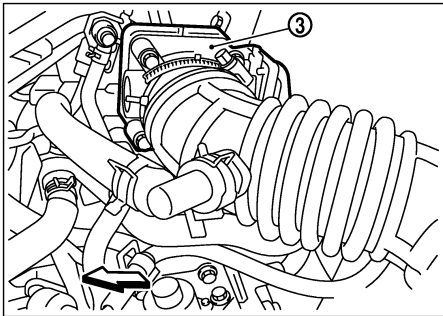
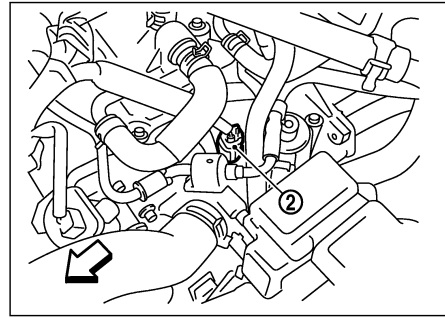
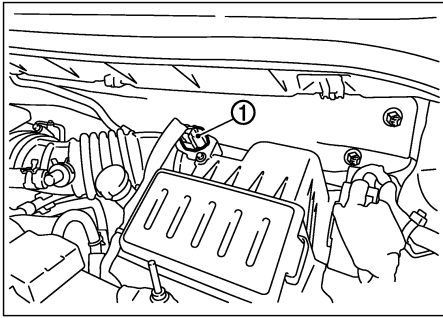
PBIB2939E

- | | | |
|---|---|--|
| 1. Ignition coil (with power transistor) and spark plug | 2. Intake valve timing control solenoid valve | 3. Refrigerant pressure sensor |
| 4. Knock sensor | 5. Fuel injector | 6. Cooling fan motor |
| 7. Camshaft position sensor (PHASE) | 8. IPDM E/R | 9. ECM |
| 10. Mass air flow sensor (with intake air temperature sensor) | 11. Engine coolant temperature sensor | 12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor) |
| 13. EVAP canister purge volume control solenoid valve | | |

AIR CONDITIONING CUT CONTROL

< FUNCTION DIAGNOSIS >

[HR16DE]



PBIB2940E

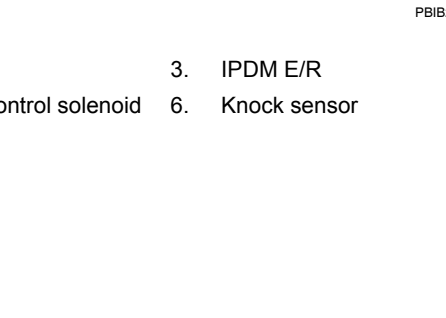
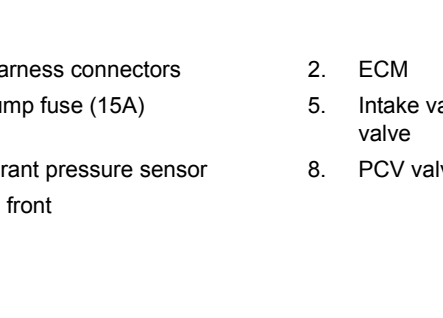
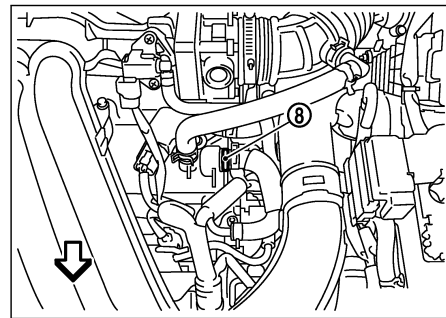
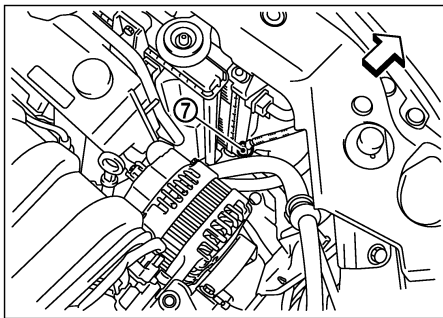
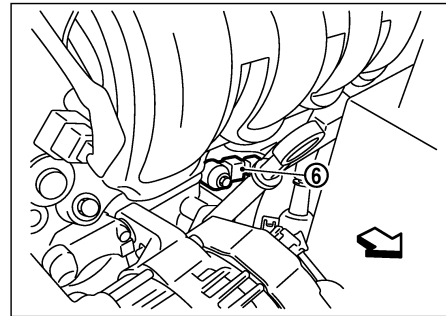
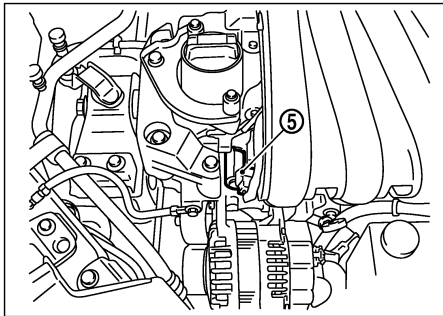
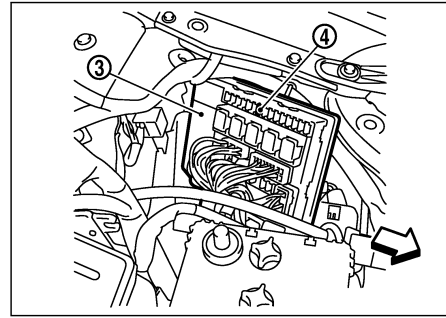
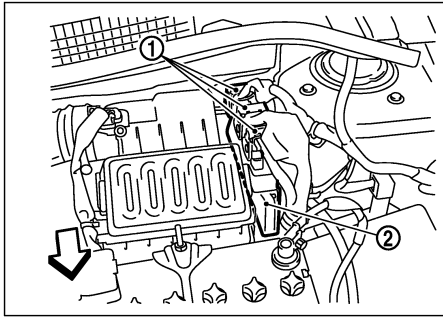
- 1. Mass air flow sensor (with intake air temperature sensor)
- 2. Engine coolant temperature sensor
- 3. Electric throttle control actuator
- 4. Camshaft position sensor (PHASE)
- 5. Ignition coil (with power transistor)
- 6. Fuel injector
- 7. EVAP canister purge volume control solenoid valve

↶ Vehicle front

AIR CONDITIONING CUT CONTROL

< FUNCTION DIAGNOSIS >

[HR16DE]



- 1. ECM harness connectors
 - 2. ECM
 - 3. IPDM E/R
 - 4. Fuel pump fuse (15A)
 - 5. Intake valve timing control solenoid
 - 6. Knock sensor
 - 7. Refrigerant pressure sensor
 - 8. PCV valve
- ↶ Vehicle front

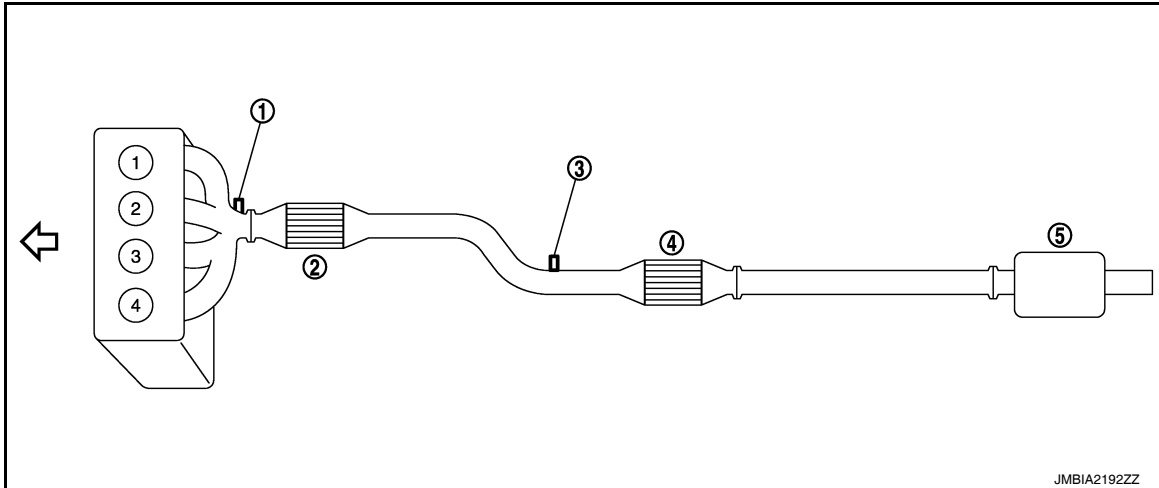
PBIB2941E

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

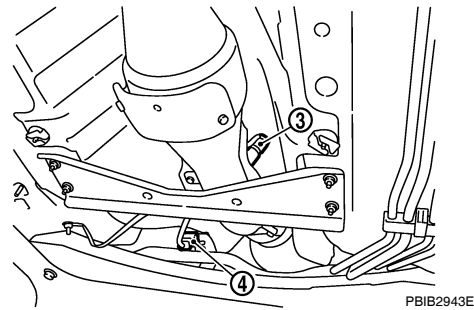
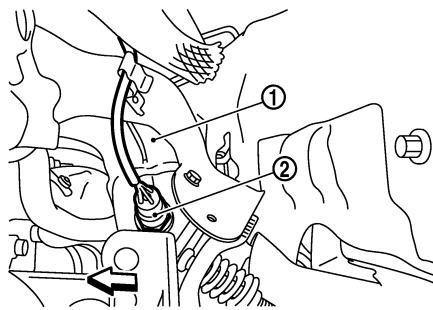
AIR CONDITIONING CUT CONTROL

< FUNCTION DIAGNOSIS >

[HR16DE]



- | | | |
|-------------------------------------|----------------------------------|---------------------------|
| 1. Air fuel ratio (A/F) sensor 1 | 2. Three way catalyst (Manifold) | 3. Heated oxygen sensor 2 |
| 4. Three way catalyst (Under floor) | 5. Muffler | |
- ⇐ Vehicle front



- | | | |
|---|----------------------------------|---------------------------|
| 1. Exhaust manifold | 2. Air fuel ratio (A/F) sensor 1 | 3. Heated oxygen sensor 2 |
| 4. Heated oxygen sensor 2 harness connector | | |
- ⇐ Vehicle front

AIR CONDITIONING CUT CONTROL

< FUNCTION DIAGNOSIS >

[HR16DE]

A

EC

C

D

E

F

G

H

I

J

K

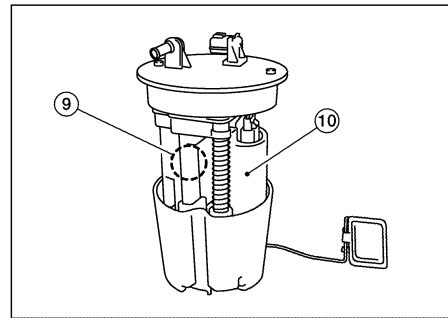
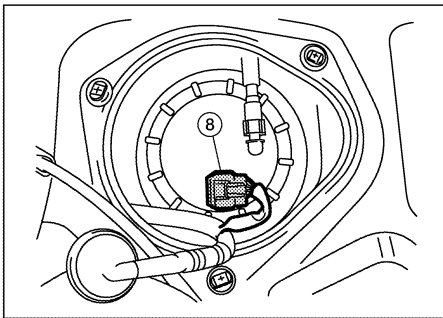
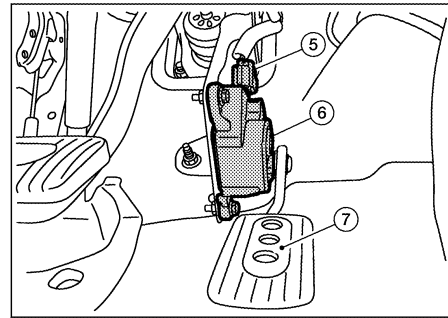
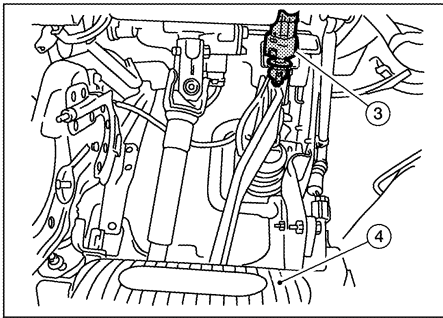
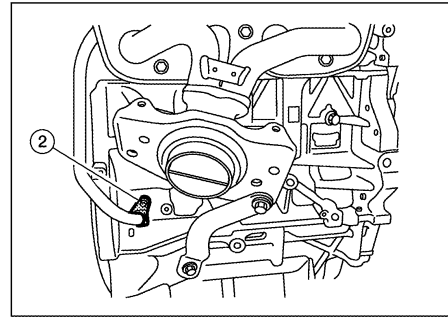
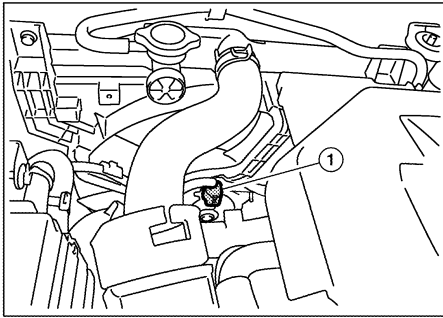
L

M

N

O

P



- 1. Cooling fan motor harness connector
- 4. Brake pedal
- 7. Accelerator pedal

- 2. Crankshaft position sensor
- 3. Stop lamp switch
- 5. Accelerator pedal position sensor harness connector
- 6. Accelerator pedal position sensor
- 8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)

- 9. Fuel pressure regulator
- 10. Fuel pump

AWBIA0044ZZ

Component Description

INFOID:000000005398263

Component	Reference
Accelerator pedal position sensor	EC-392, "Description"
Camshaft position sensor (PHASE)	EC-262, "Description"
Crankshaft position sensor (POS)	EC-257, "Description"

AIR CONDITIONING CUT CONTROL

< FUNCTION DIAGNOSIS >

[HR16DE]

Component	Reference
Engine coolant temperature sensor	EC-161, "Description"
Refrigerant pressure sensor	EC-450, "Description"

CAN COMMUNICATION

System Description

INFOID:000000005398264

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

Refer to [LAN-27. "CAN Communication Signal Chart"](#), about CAN communication for detail.

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

COOLING FAN CONTROL

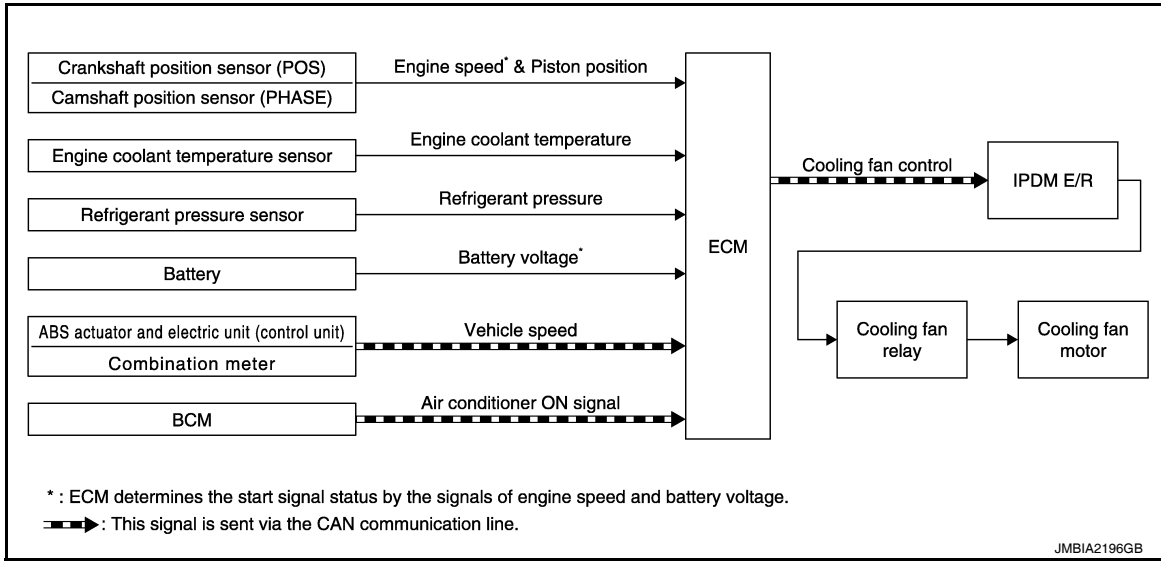
< FUNCTION DIAGNOSIS >

[HR16DE]

COOLING FAN CONTROL

System Diagram

INFOID:000000005398265



System Description

INFOID:000000005398266

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed* ¹	Cooling fan control	IPDM E/R ↓ Cooling fan relay ↓ Cooling fan motor
Battery	Battery voltage* ¹		
ABS actuator and electric unit (control unit) Combination meter	Vehicle speed* ²		
Engine coolant temperature sensor	Engine coolant temperature		
BCM	Air conditioner ON signal* ²		
Refrigerant pressure sensor	Refrigerant pressure		

*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to ECM via the CAN communication line.

SYSTEM DESCRIPTION

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pressure, air conditioner ON signal. Then control system has 3-step control [HIGH/LOW/OFF].

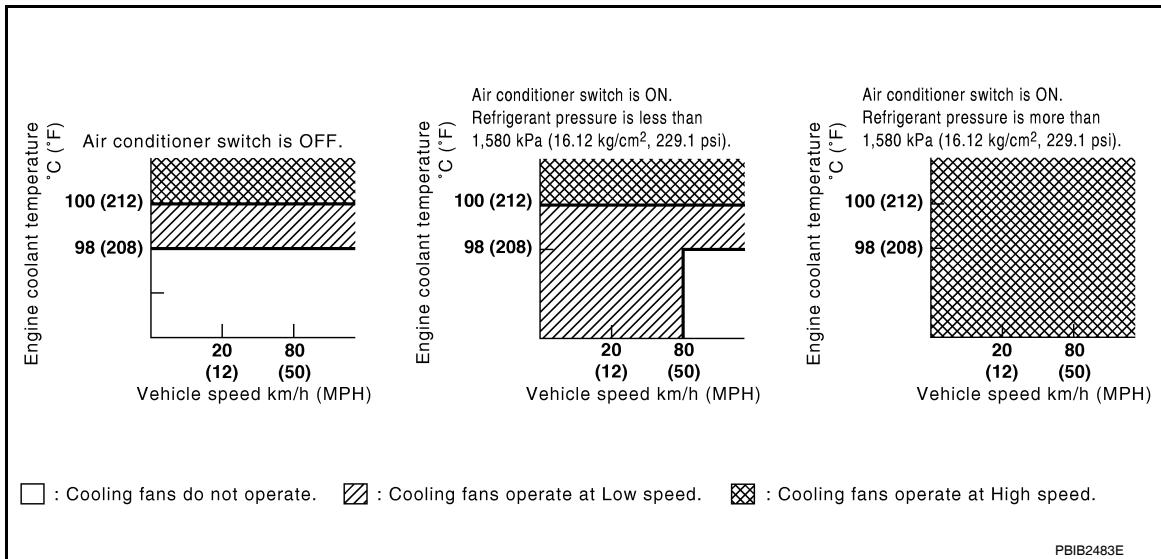
Cooling Fan Operation

COOLING FAN CONTROL

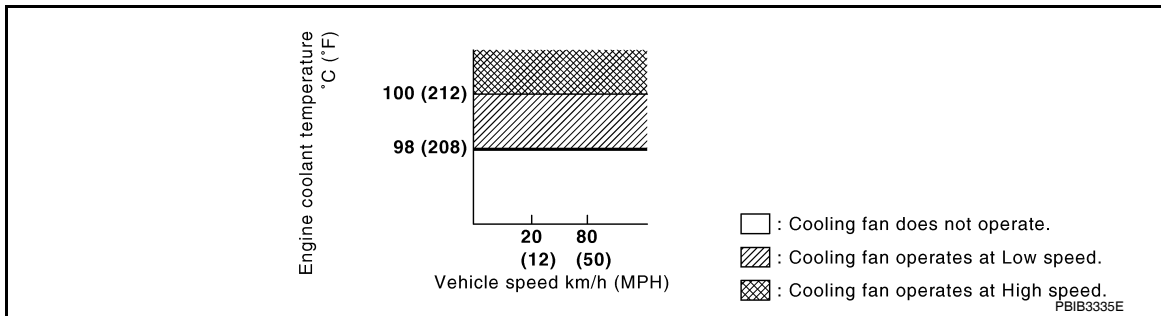
< FUNCTION DIAGNOSIS >

[HR16DE]

Models with A/C



Models without A/C



Cooling Fan Relay Operation

The ECM controls cooling fan relays via the CAN communication line.

Cooling fan speed	Cooling fan relay		
	1	2	3
Stop (OFF)	OFF	OFF	OFF
Low (LOW)	ON	OFF	OFF
High (HI)	ON	ON	ON

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

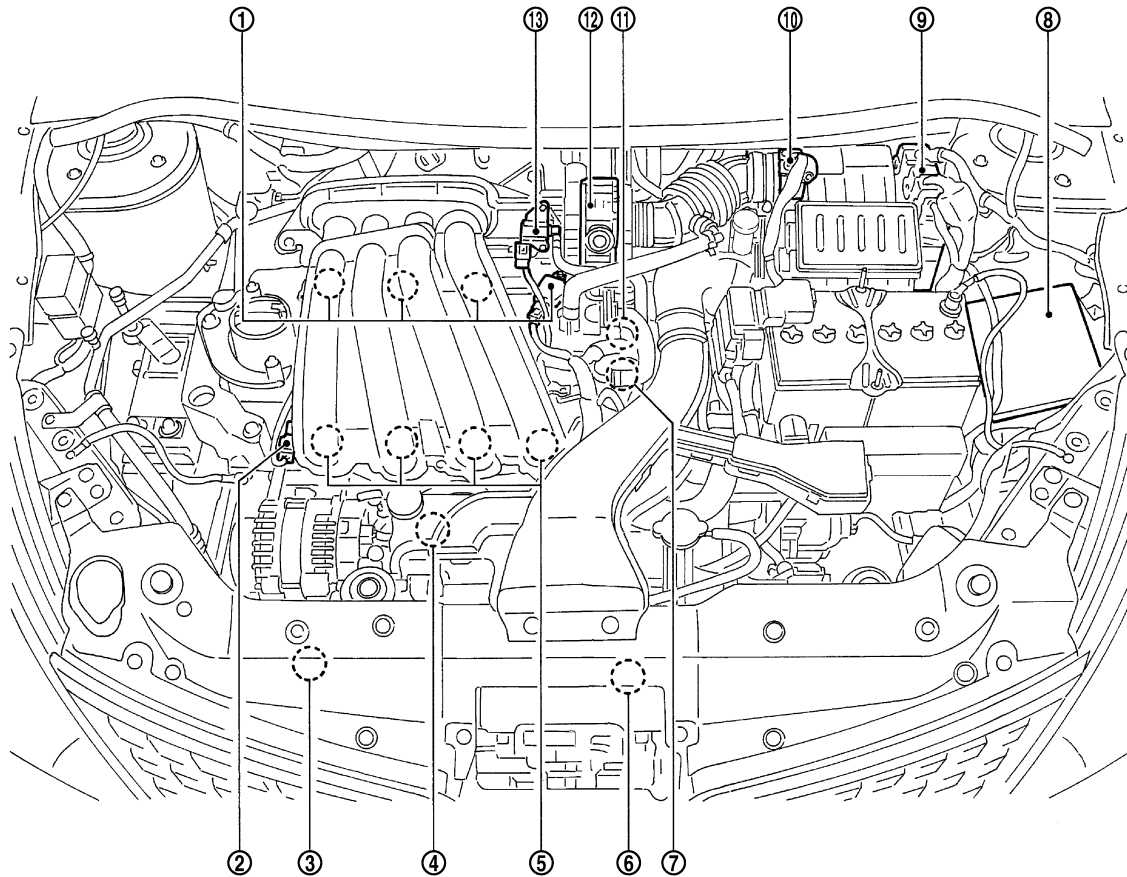
COOLING FAN CONTROL

< FUNCTION DIAGNOSIS >

[HR16DE]

Component Parts Location

INFOID:000000005398267



PBIB2939E

- | | | |
|---|---|--|
| 1. Ignition coil (with power transistor) and spark plug | 2. Intake valve timing control solenoid valve | 3. Refrigerant pressure sensor |
| 4. Knock sensor | 5. Fuel injector | 6. Cooling fan motor |
| 7. Camshaft position sensor (PHASE) | 8. IPDM E/R | 9. ECM |
| 10. Mass air flow sensor (with intake air temperature sensor) | 11. Engine coolant temperature sensor | 12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor) |
| 13. EVAP canister purge volume control solenoid valve | | |

COOLING FAN CONTROL

< FUNCTION DIAGNOSIS >

[HR16DE]

A

EC

C

D

E

F

G

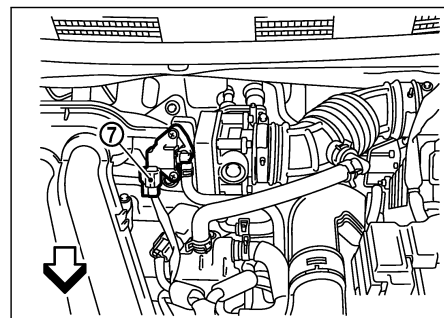
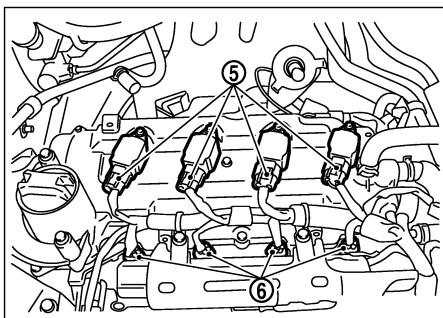
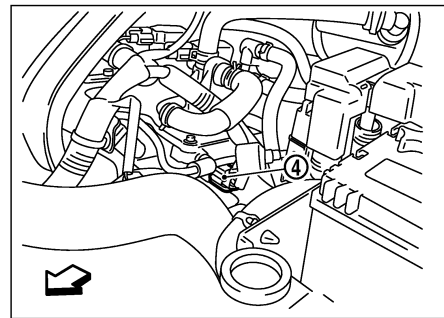
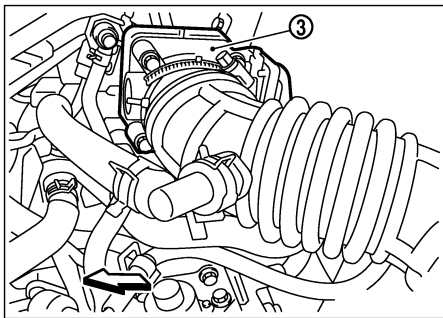
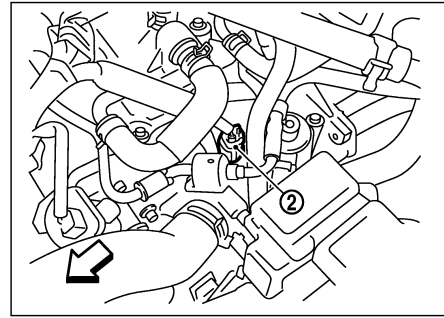
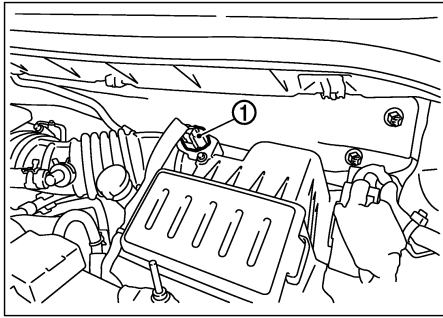
H

I

J

K

L



PBIB2940E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Camshaft position sensor (PHASE)
5. Ignition coil (with power transistor)
6. Fuel injector
7. EVAP canister purge volume control solenoid valve

↶ Vehicle front

M

N

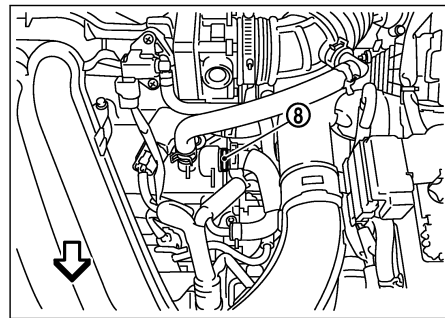
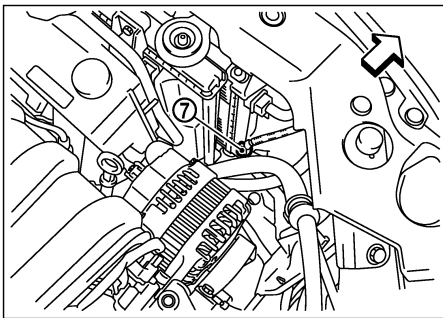
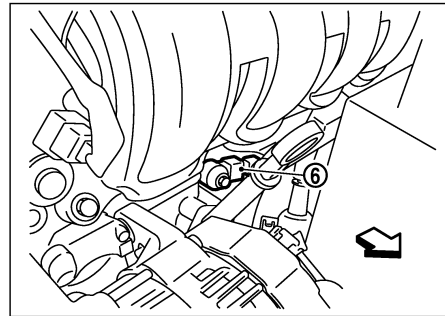
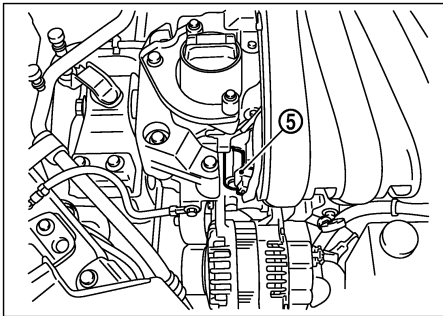
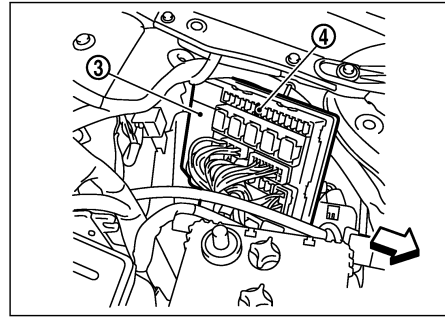
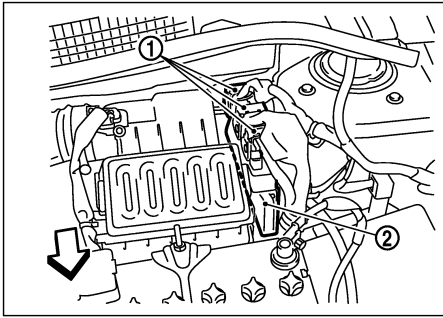
O

P

COOLING FAN CONTROL

< FUNCTION DIAGNOSIS >

[HR16DE]



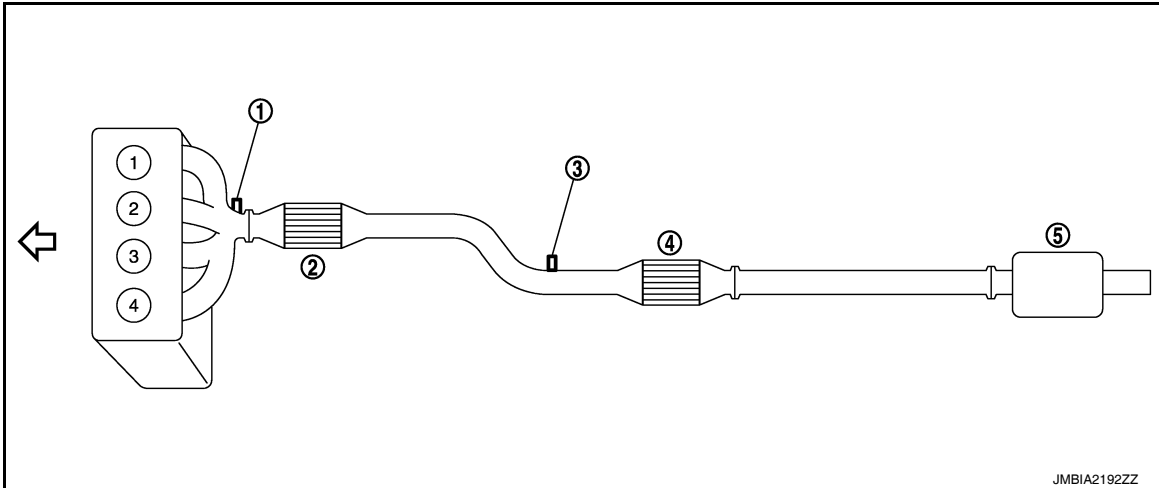
- | | | |
|--------------------------------|---|-----------------|
| 1. ECM harness connectors | 2. ECM | 3. IPDM E/R |
| 4. Fuel pump fuse (15A) | 5. Intake valve timing control solenoid valve | 6. Knock sensor |
| 7. Refrigerant pressure sensor | 8. PCV valve | |
- ↙ Vehicle front

PBIB2941E

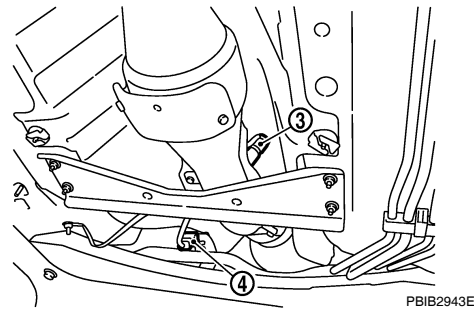
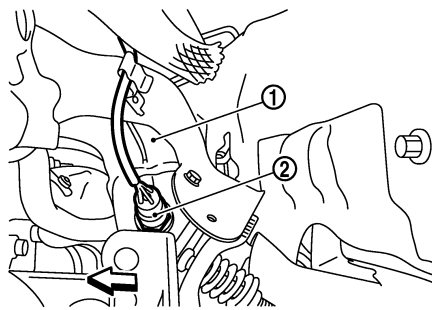
COOLING FAN CONTROL

< FUNCTION DIAGNOSIS >

[HR16DE]

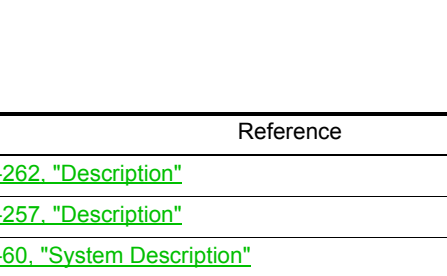
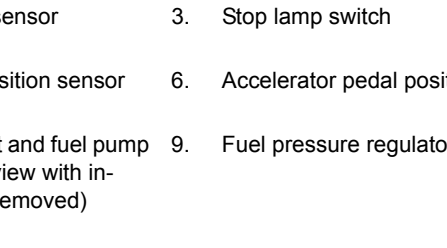
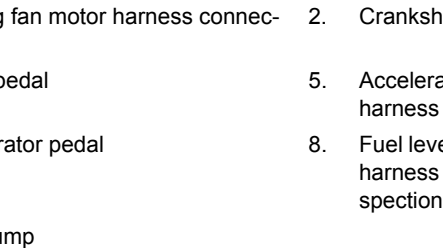
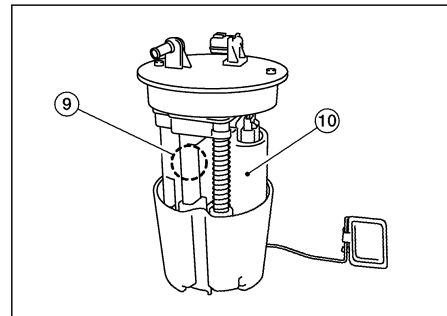
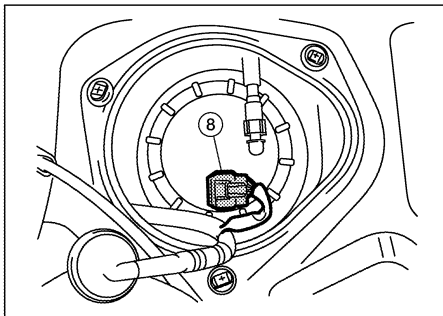
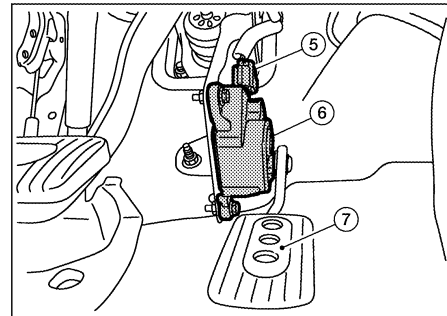
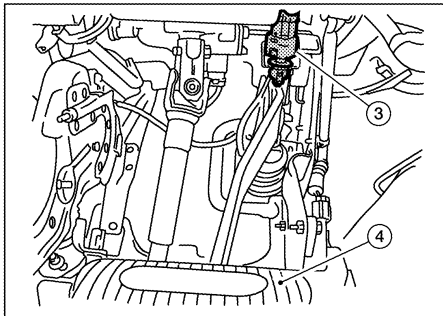
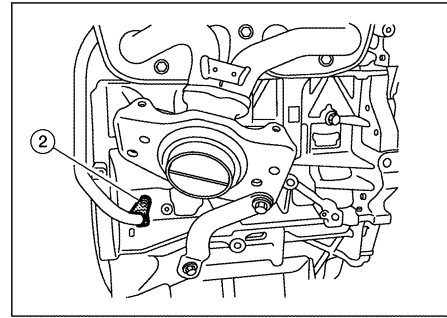
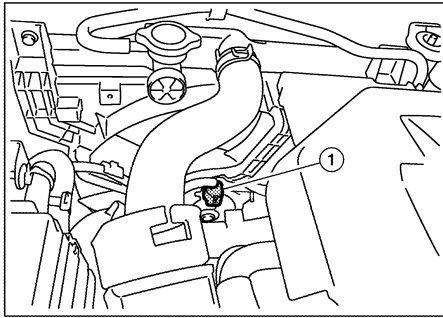


- | | | |
|-------------------------------------|----------------------------------|---------------------------|
| 1. Air fuel ratio (A/F) sensor 1 | 2. Three way catalyst (Manifold) | 3. Heated oxygen sensor 2 |
| 4. Three way catalyst (Under floor) | 5. Muffler | |
- ← Vehicle front



- | | | |
|---|----------------------------------|---------------------------|
| 1. Exhaust manifold | 2. Air fuel ratio (A/F) sensor 1 | 3. Heated oxygen sensor 2 |
| 4. Heated oxygen sensor 2 harness connector | | |
- ← Vehicle front

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P



AWBIA0044ZZ

- | | | |
|--|---|--------------------------------------|
| 1. Cooling fan motor harness connector | 2. Crankshaft position sensor | 3. Stop lamp switch |
| 4. Brake pedal | 5. Accelerator pedal position sensor harness connector | 6. Accelerator pedal position sensor |
| 7. Accelerator pedal | 8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed) | 9. Fuel pressure regulator |
| 10. Fuel pump | | |

Component Description

INFOID:000000005398268

Component	Reference
Camshaft position sensor (PHASE)	EC-262, "Description"
Crankshaft position sensor (POS)	EC-257, "Description"
Cooling fan motor	EC-60, "System Description"

COOLING FAN CONTROL

< FUNCTION DIAGNOSIS >

[HR16DE]

Component	Reference
Engine coolant temperature sensor	EC-161, "Description"
Refrigerant pressure sensor	EC-450, "Description"

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

EVAPORATIVE EMISSION SYSTEM

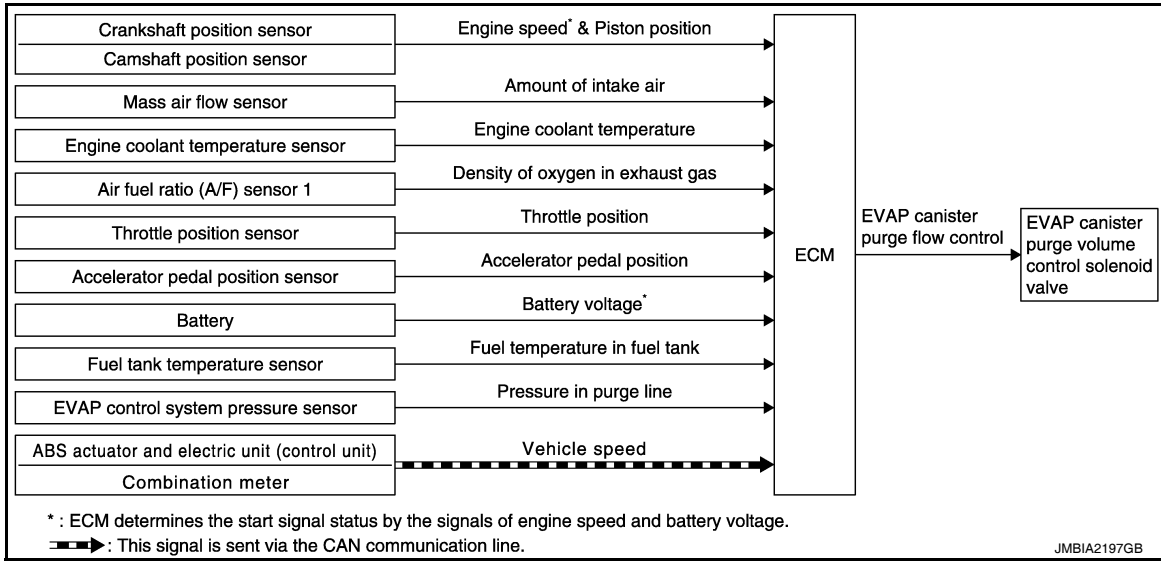
< FUNCTION DIAGNOSIS >

[HR16DE]

EVAPORATIVE EMISSION SYSTEM

System Diagram

INFOID:000000005398269



System Description

INFOID:000000005398270

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	EVAP canister purge flow control	EVAP canister purge vol- ume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*1		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
EVAP control system pressure sensor	Pressure in purge line		
ABS actuator and electric unit (control unit) Combination meter	Vehicle speed*2		

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

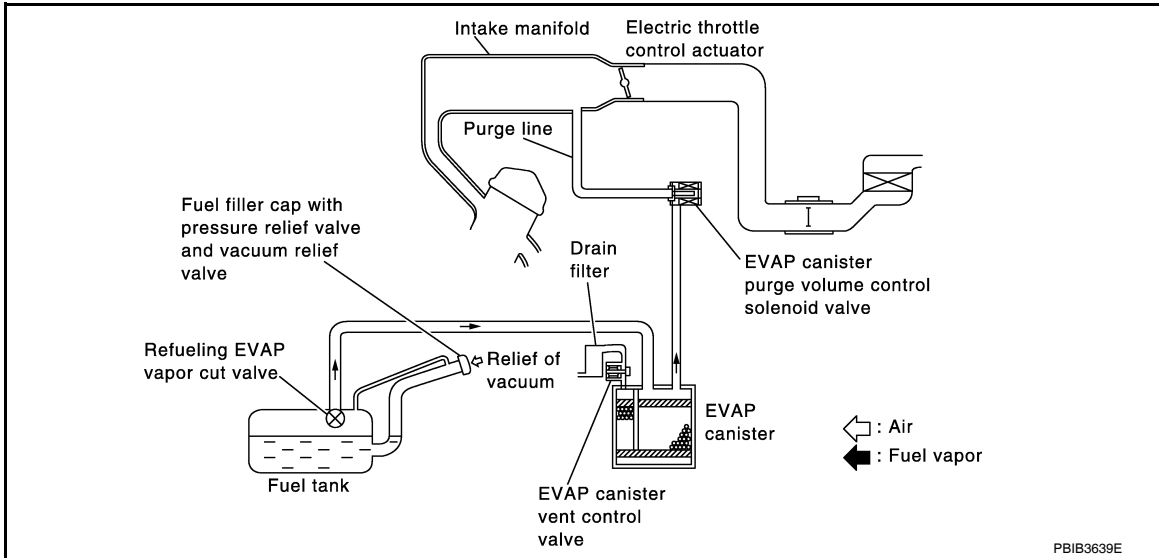
*2: This signal is sent to the ECM via the CAN communication line.

EVAPORATIVE EMISSION SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]

SYSTEM DESCRIPTION



The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister. The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.

The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.

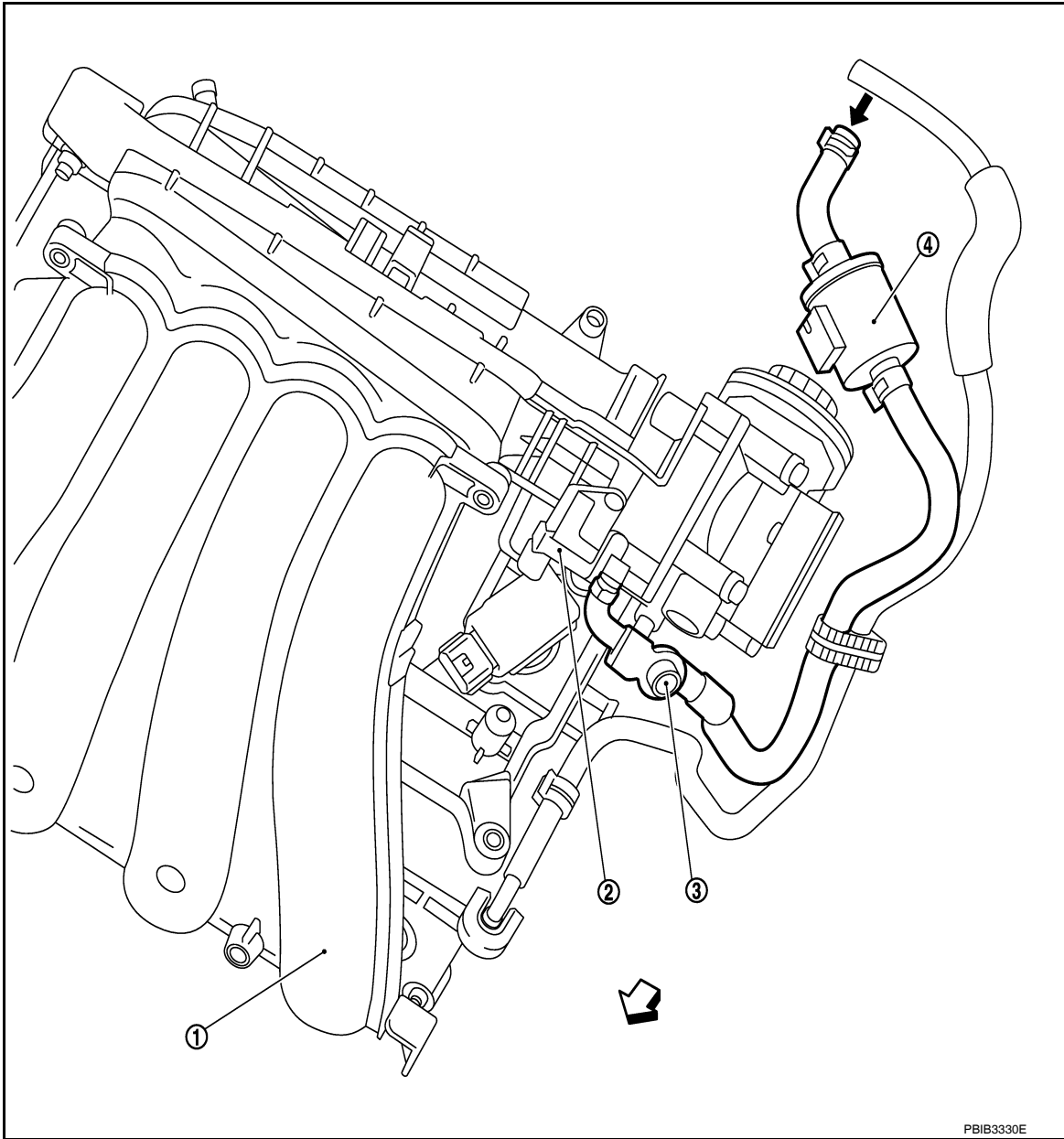
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating.

EVAPORATIVE EMISSION LINE DRAWING

EVAPORATIVE EMISSION SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]



1. Intake manifold collector

2. EVAP canister purge volume control solenoid valve 3. EVAP service port solenoid valve

4. EVAP purge resonator

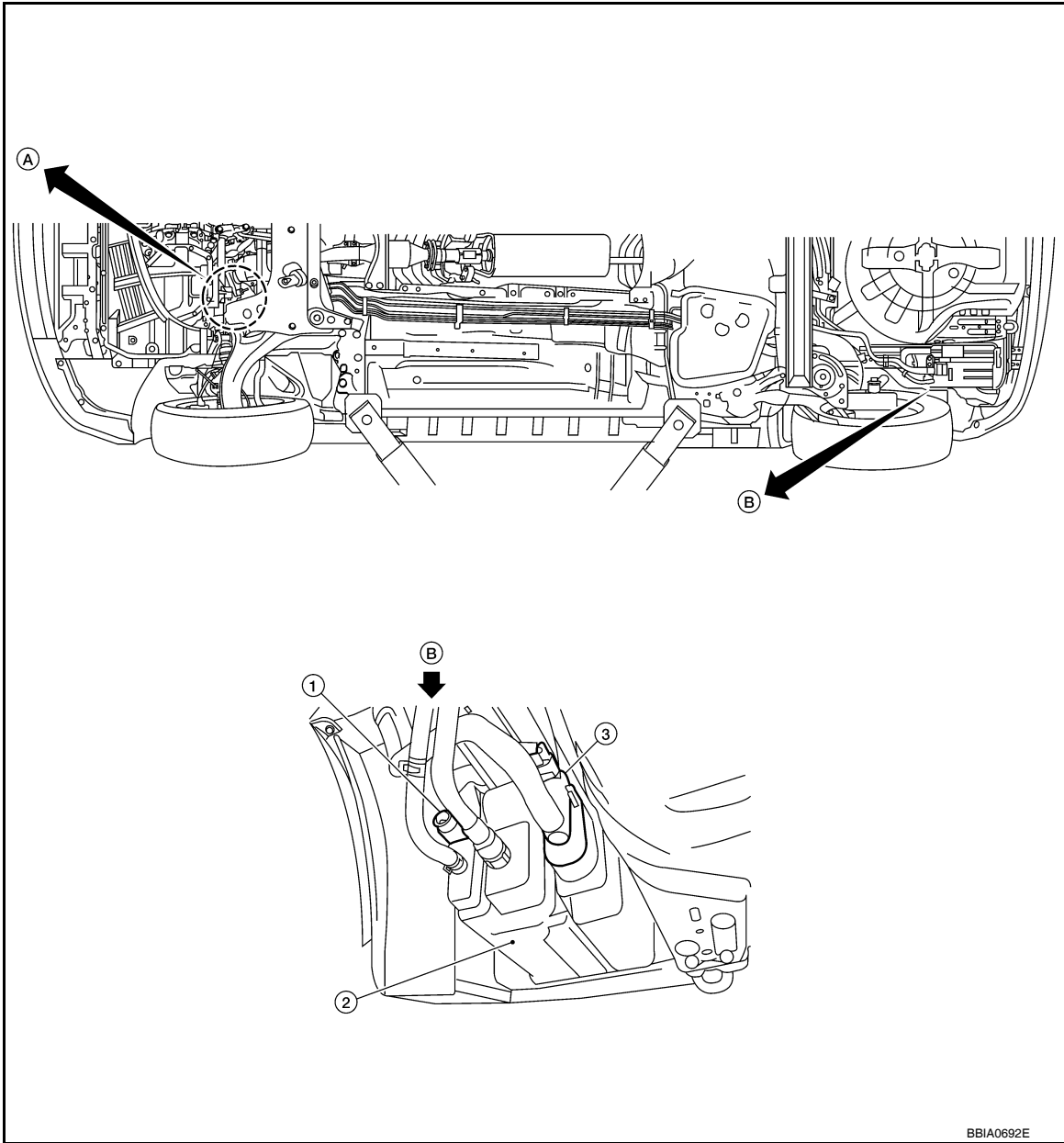
↶ Vehicle front

➔ From next figure

EVAPORATIVE EMISSION SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]



1. EVAP control system pressure sensor 2. EVAP canister 3. EVAP canister vent control valve

A. To previous figure

NOTE:

Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

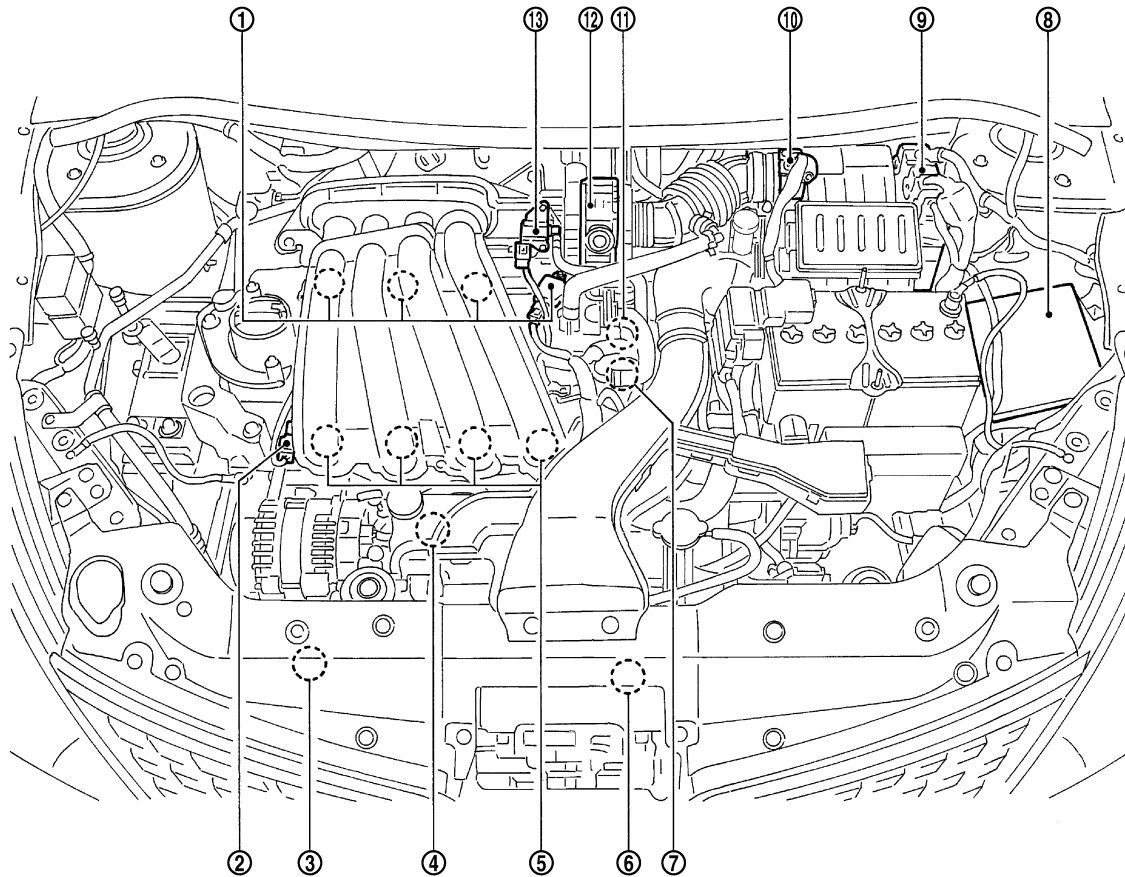
EVAPORATIVE EMISSION SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]

Component Parts Location

INFOID:000000005398271



PBIB2939E

- | | | |
|---|---|--|
| 1. Ignition coil (with power transistor) and spark plug | 2. Intake valve timing control solenoid valve | 3. Refrigerant pressure sensor |
| 4. Knock sensor | 5. Fuel injector | 6. Cooling fan motor |
| 7. Camshaft position sensor (PHASE) | 8. IPDM E/R | 9. ECM |
| 10. Mass air flow sensor (with intake air temperature sensor) | 11. Engine coolant temperature sensor | 12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor) |
| 13. EVAP canister purge volume control solenoid valve | | |

EVAPORATIVE EMISSION SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]

A

EC

C

D

E

F

G

H

I

J

K

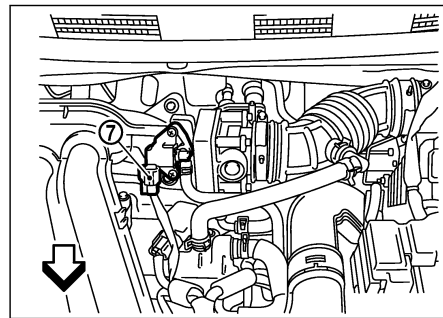
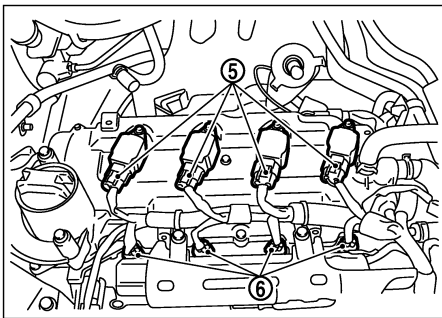
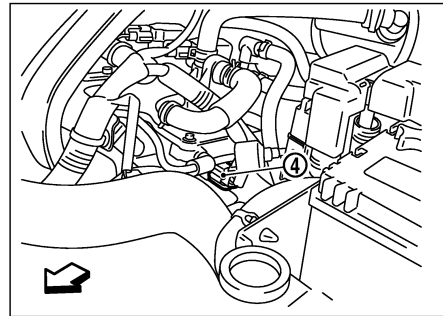
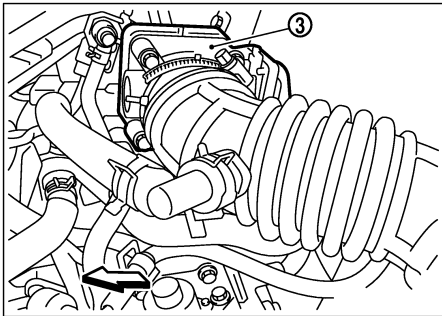
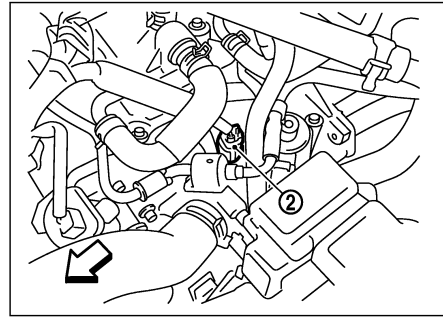
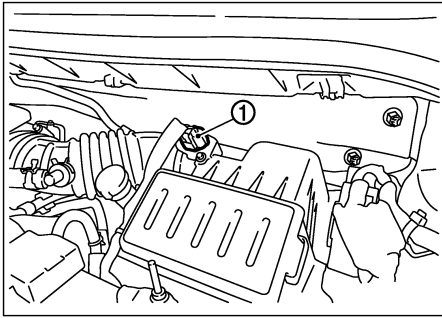
L

M

N

O

P



PBIB2940E

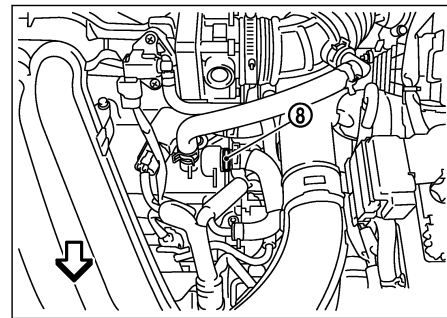
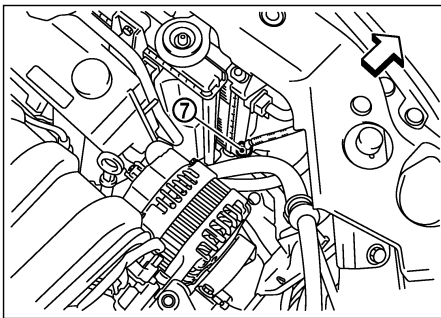
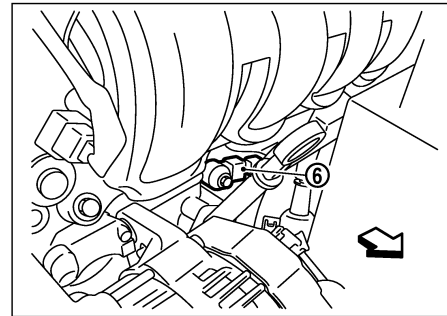
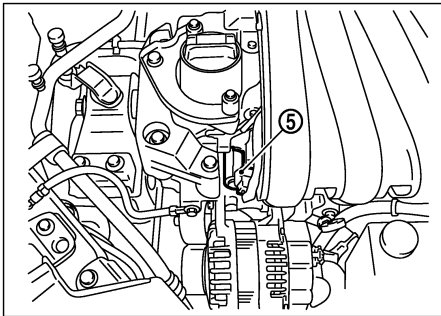
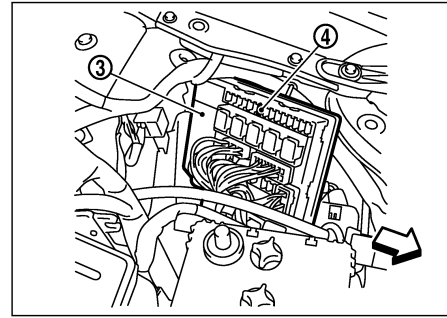
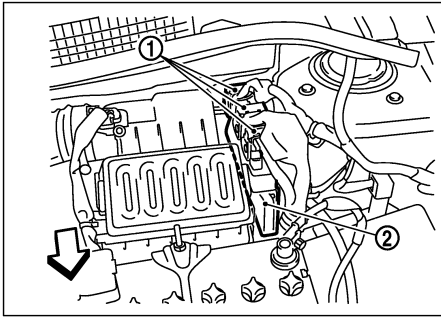
- | | | |
|---|--|---------------------------------------|
| 1. Mass air flow sensor
(with intake air temperature sensor) | 2. Engine coolant temperature sensor | 3. Electric throttle control actuator |
| 4. Camshaft position sensor (PHASE) | 5. Ignition coil (with power transistor) | 6. Fuel injector |
| 7. EVAP canister purge volume control
solenoid valve | | |

↶ Vehicle front

EVAPORATIVE EMISSION SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]



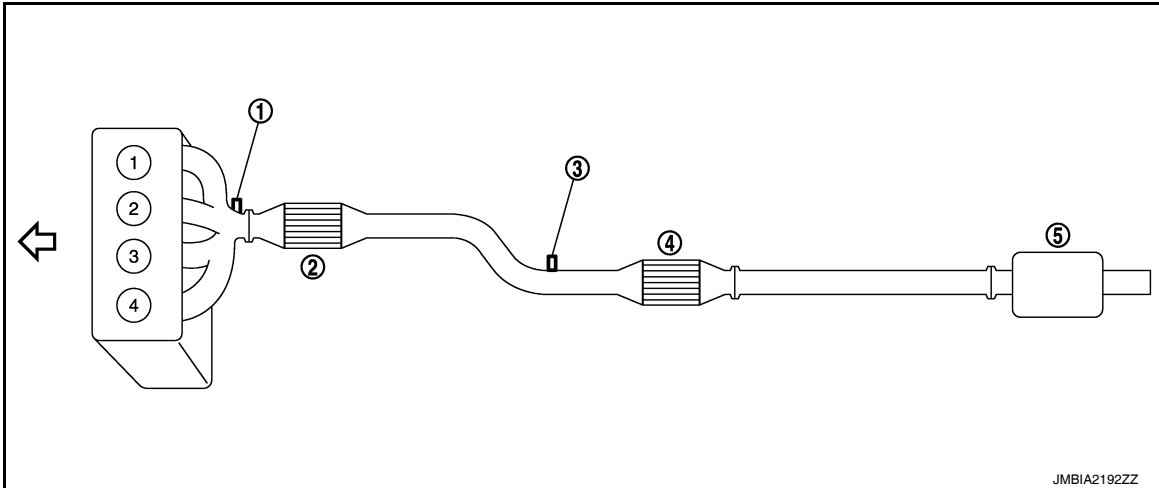
PBIB2941E

- | | | |
|--------------------------------|---|-----------------|
| 1. ECM harness connectors | 2. ECM | 3. IPDM E/R |
| 4. Fuel pump fuse (15A) | 5. Intake valve timing control solenoid valve | 6. Knock sensor |
| 7. Refrigerant pressure sensor | 8. PCV valve | |
- ← Vehicle front

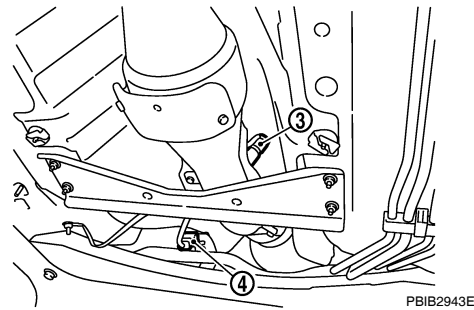
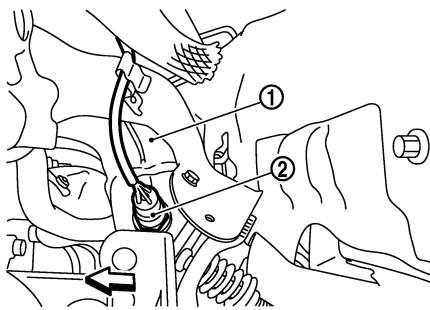
EVAPORATIVE EMISSION SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]



- 1. Air fuel ratio (A/F) sensor 1
 - 2. Three way catalyst (Manifold)
 - 3. Heated oxygen sensor 2
 - 4. Three way catalyst (Under floor)
 - 5. Muffler
- ← Vehicle front



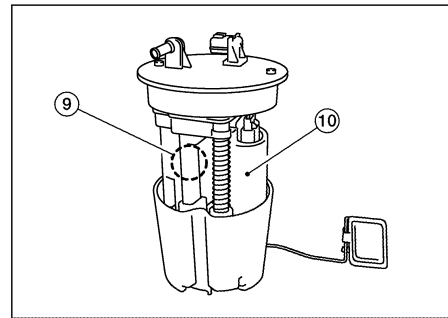
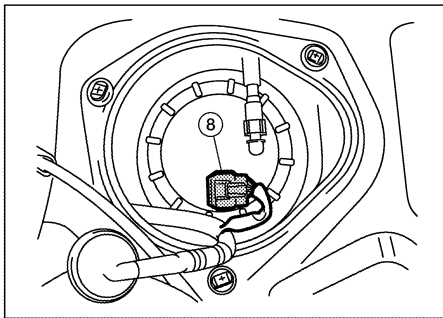
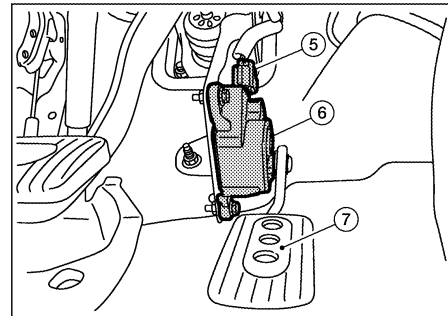
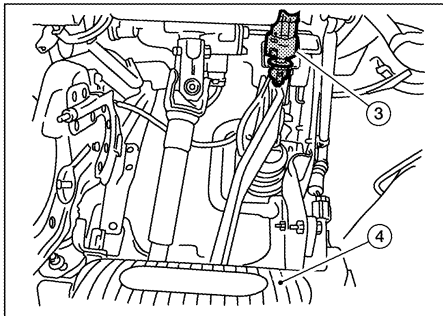
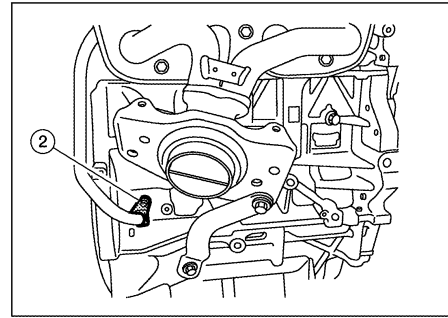
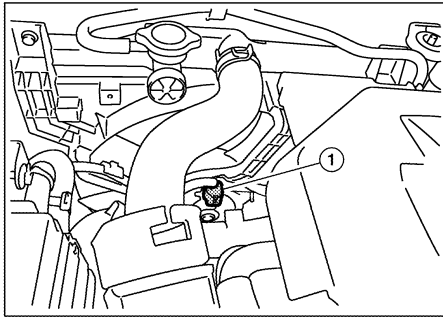
- 1. Exhaust manifold
 - 2. Air fuel ratio (A/F) sensor 1
 - 3. Heated oxygen sensor 2
 - 4. Heated oxygen sensor 2 harness connector
- ← Vehicle front

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

EVAPORATIVE EMISSION SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]



AWBIA0044ZZ

- | | | |
|--|---|--------------------------------------|
| 1. Cooling fan motor harness connector | 2. Crankshaft position sensor | 3. Stop lamp switch |
| 4. Brake pedal | 5. Accelerator pedal position sensor harness connector | 6. Accelerator pedal position sensor |
| 7. Accelerator pedal | 8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed) | 9. Fuel pressure regulator |
| 10. Fuel pump | | |

Component Description

INFOID:000000005398272

Component	Reference
A/F sensor 1	EC-176. "Description"
Accelerator pedal position sensor	EC-392. "Description"
Camshaft position sensor (PHASE)	EC-262. "Description"
Crankshaft position sensor (POS)	EC-257. "Description"

EVAPORATIVE EMISSION SYSTEM

[HR16DE]

< FUNCTION DIAGNOSIS >

Component	Reference	
Engine coolant temperature sensor	EC-161. "Description"	A
EVAP canister purge volume control solenoid valve	EC-285. "Description"	
EVAP control system pressure sensor	EC-306. "Description"	EC
Fuel tank temperature sensor	EC-234. "Description"	
Mass air flow sensor	EC-142. "Description"	C
Throttle position sensor	EC-165. "Description"	

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

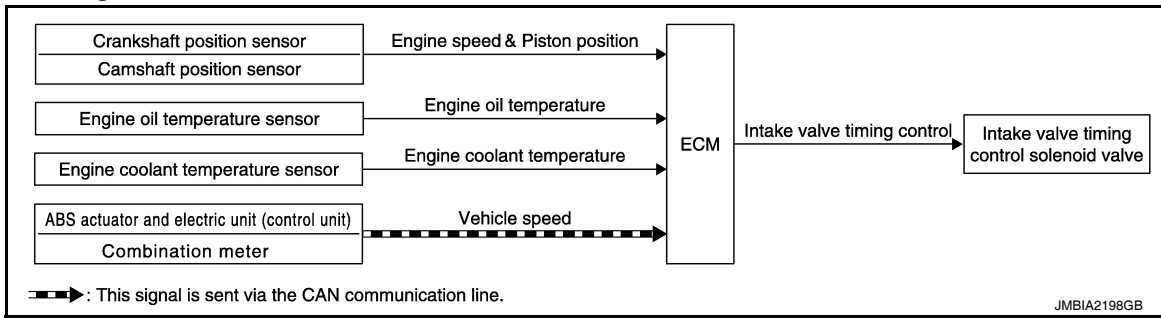
INTAKE VALVE TIMING CONTROL

< FUNCTION DIAGNOSIS >

[HR16DE]

INTAKE VALVE TIMING CONTROL

System Diagram



System Description

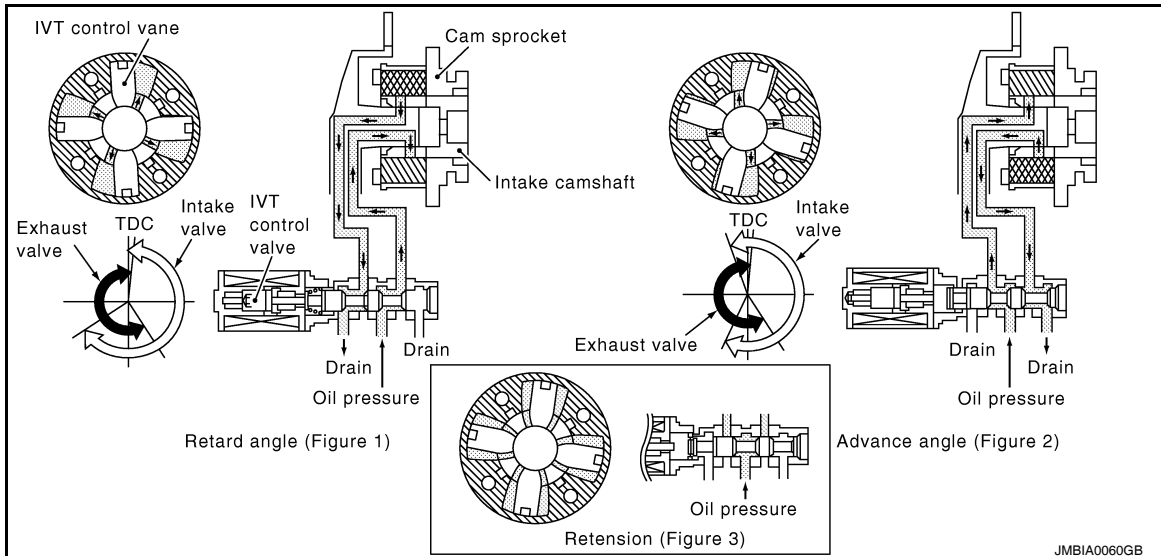
INFOID:000000005398274

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed and piston position	Intake valve timing control	Intake valve timing control solenoid valve
Camshaft position sensor (PHASE)			
Engine coolant temperature sensor	Engine coolant temperature		
ABS actuator and electric unit (control unit)	Vehicle speed*		
Combination meter			

*: This signal is sent to the ECM via the CAN communication line

SYSTEM DESCRIPTION



This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing (IVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

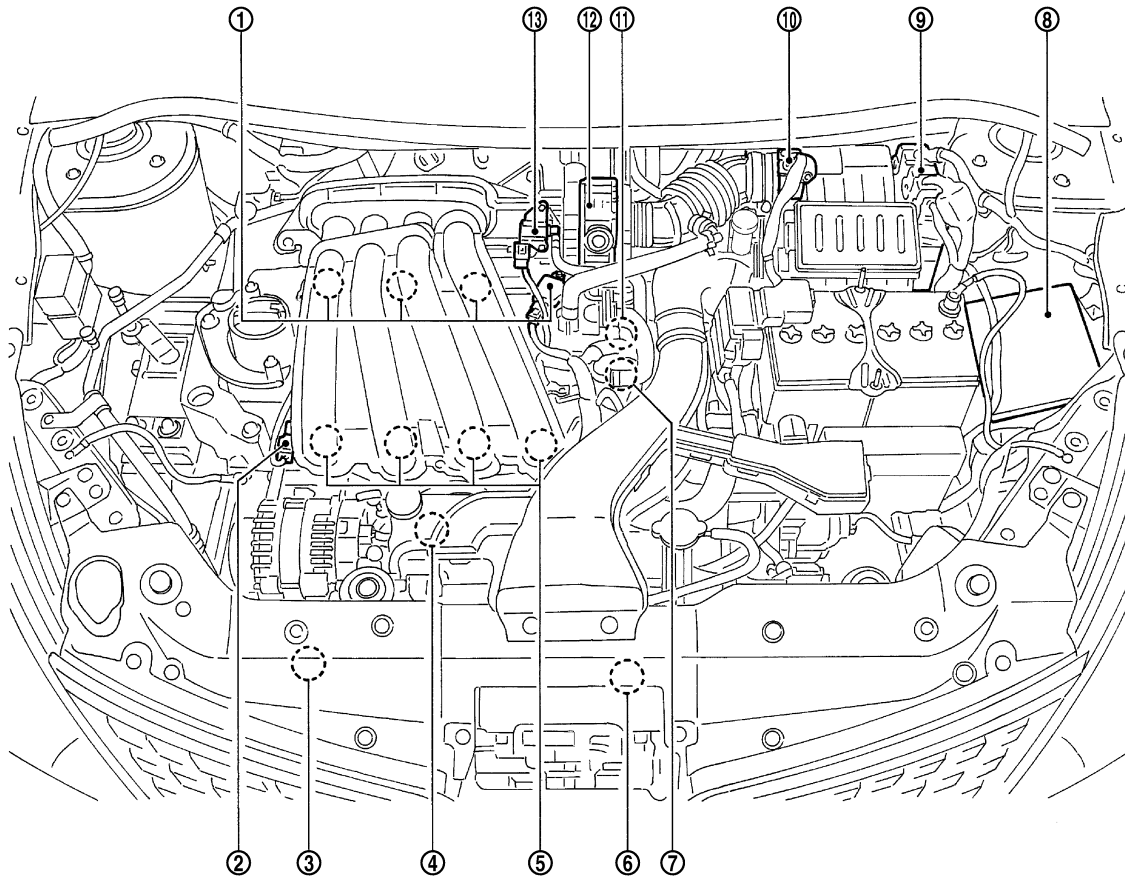
INTAKE VALVE TIMING CONTROL

< FUNCTION DIAGNOSIS >

[HR16DE]

Component Parts Location

INFOID:000000005398275



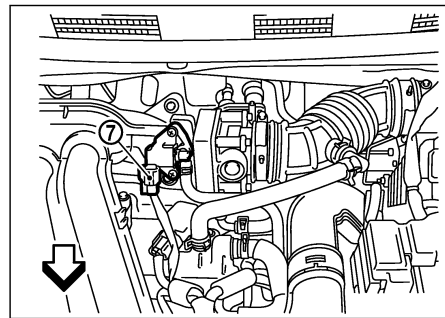
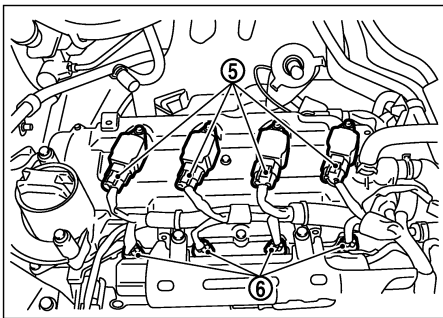
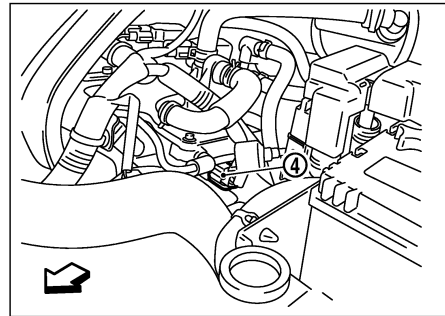
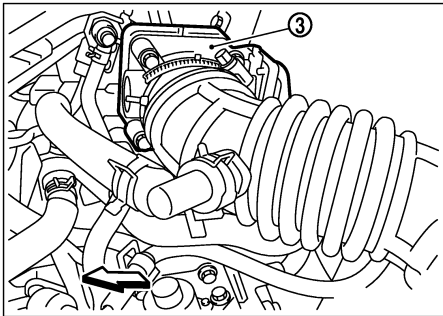
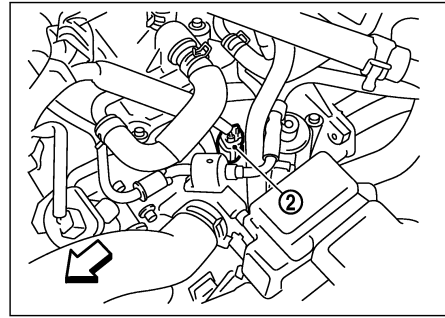
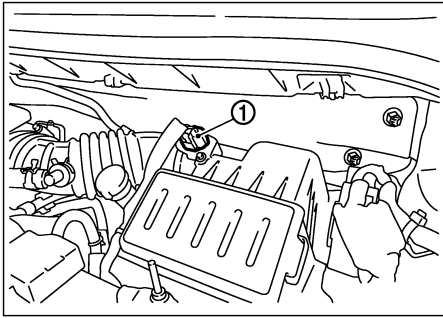
PBIB2939E

- | | | |
|---|---|--|
| 1. Ignition coil (with power transistor) and spark plug | 2. Intake valve timing control solenoid valve | 3. Refrigerant pressure sensor |
| 4. Knock sensor | 5. Fuel injector | 6. Cooling fan motor |
| 7. Camshaft position sensor (PHASE) | 8. IPDM E/R | 9. ECM |
| 10. Mass air flow sensor (with intake air temperature sensor) | 11. Engine coolant temperature sensor | 12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor) |
| 13. EVAP canister purge volume control solenoid valve | | |

INTAKE VALVE TIMING CONTROL

< FUNCTION DIAGNOSIS >

[HR16DE]



PBIB2940E

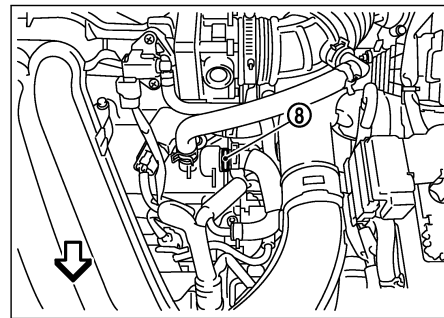
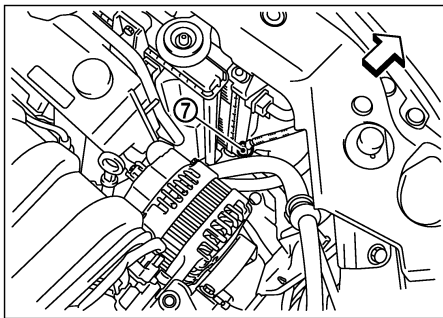
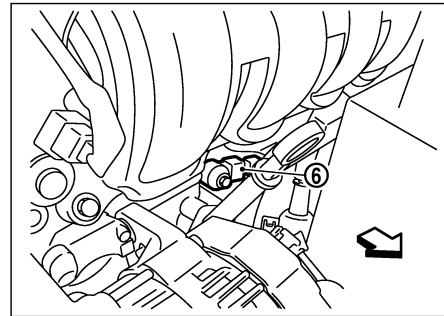
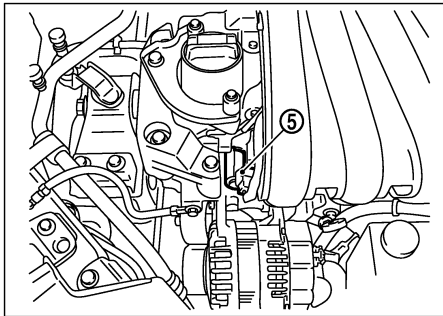
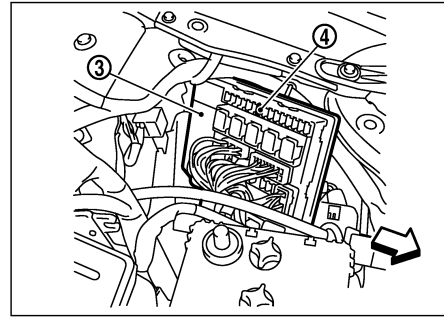
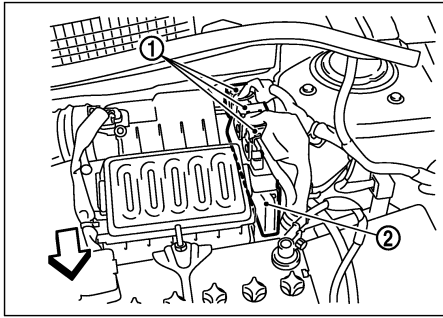
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Camshaft position sensor (PHASE)
5. Ignition coil (with power transistor)
6. Fuel injector
7. EVAP canister purge volume control solenoid valve

↶ Vehicle front

INTAKE VALVE TIMING CONTROL

< FUNCTION DIAGNOSIS >

[HR16DE]



PBIB2941E

- | | | |
|--------------------------------|---|-----------------|
| 1. ECM harness connectors | 2. ECM | 3. IPDM E/R |
| 4. Fuel pump fuse (15A) | 5. Intake valve timing control solenoid valve | 6. Knock sensor |
| 7. Refrigerant pressure sensor | 8. PCV valve | |
- ↶ Vehicle front

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

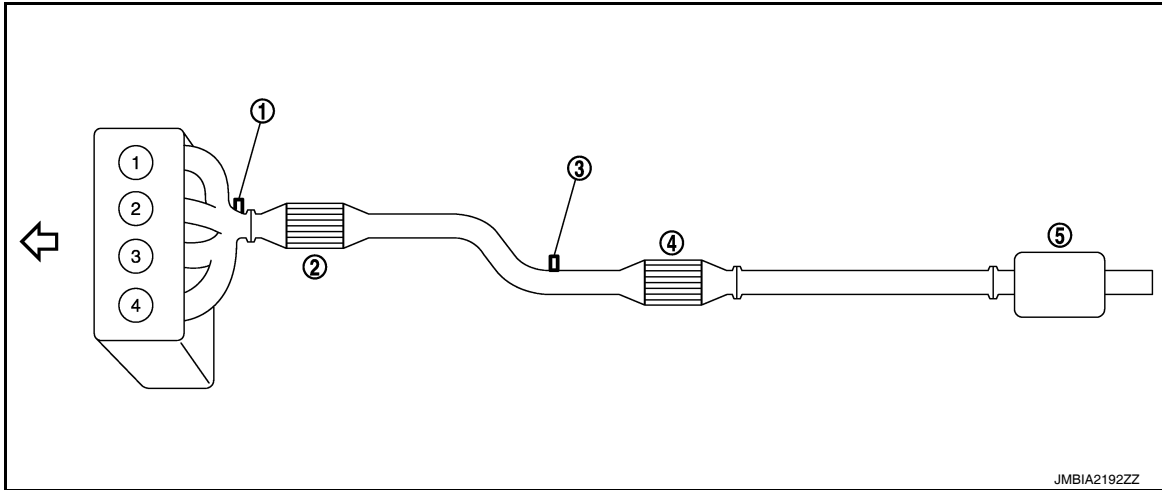
O

P

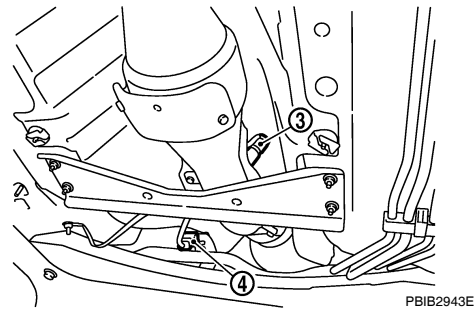
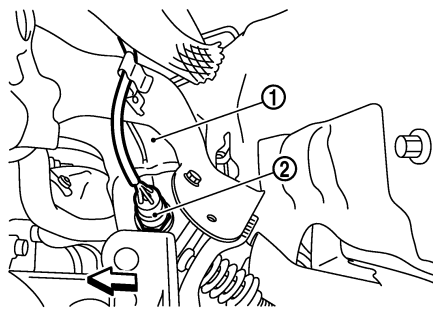
INTAKE VALVE TIMING CONTROL

< FUNCTION DIAGNOSIS >

[HR16DE]



- | | | |
|-------------------------------------|----------------------------------|---------------------------|
| 1. Air fuel ratio (A/F) sensor 1 | 2. Three way catalyst (Manifold) | 3. Heated oxygen sensor 2 |
| 4. Three way catalyst (Under floor) | 5. Muffer | |
- ← Vehicle front



- | | | |
|---|----------------------------------|---------------------------|
| 1. Exhaust manifold | 2. Air fuel ratio (A/F) sensor 1 | 3. Heated oxygen sensor 2 |
| 4. Heated oxygen sensor 2 harness connector | | |
- ← Vehicle front

INTAKE VALVE TIMING CONTROL

< FUNCTION DIAGNOSIS >

[HR16DE]

A

EC

C

D

E

F

G

H

I

J

K

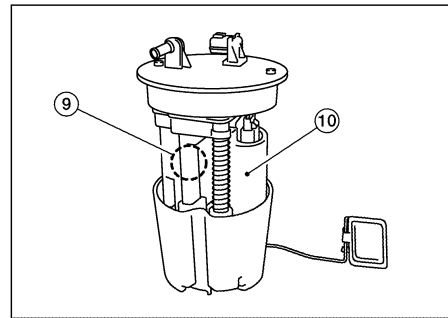
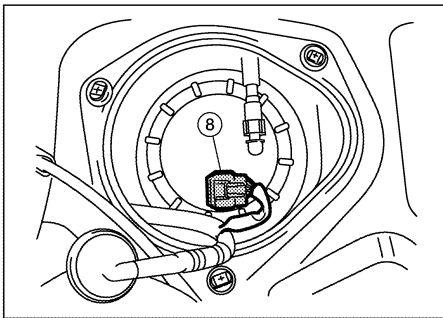
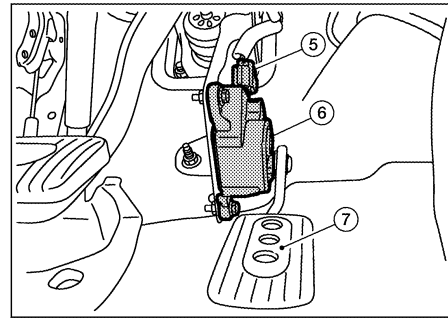
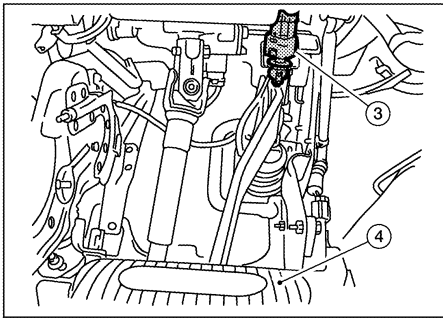
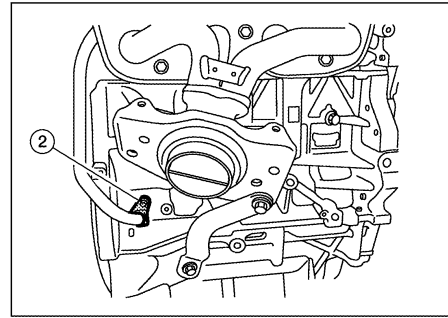
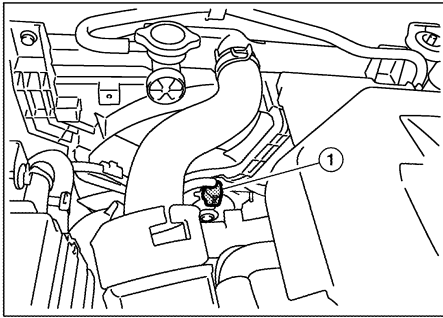
L

M

N

O

P



- 1. Cooling fan motor harness connector
- 4. Brake pedal
- 7. Accelerator pedal

- 2. Crankshaft position sensor
- 5. Accelerator pedal position sensor harness connector
- 8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)

- 3. Stop lamp switch
- 6. Accelerator pedal position sensor
- 9. Fuel pressure regulator

- 10. Fuel pump

AWBIA0044ZZ

Component Description

INFOID:000000005398276

Component	Reference
Camshaft position sensor (PHASE)	EC-262. "Description"
Crankshaft position sensor (POS)	EC-257. "Description"
Engine coolant temperature sensor	EC-161. "Description"
Intake valve timing control solenoid valve	EC-78. "System Description"

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:000000005398277

INTRODUCTION

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	Diagnostic service
Diagnostic Trouble Code (DTC)	Service \$03 of SAE J1979/ISO 15031-5
Freeze Frame data	Service \$02 of SAE J1979/ISO 15031-5
System Readiness Test (SRT) code	Service \$01 of SAE J1979/ISO 15031-5
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Service \$07 of SAE J1979/ISO 15031-5
1st Trip Freeze Frame data	—
Test values and Test limits	Service \$06 of SAE J1979/ISO 15031-5
Calibration ID	Service \$09 of SAE J1979/ISO 15031-5
Permanent Diagnostic Trouble Code (Permanent DTC)	Service \$0A* of SAE J1979/ISO 15031-5

*: Service \$0A is not applied for regions where it is not mandated.

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	SRT status	Test value	Permanent DTC status
CONSULT-III	×	×	×	×	×	×	—	×
GST	×	×	×	—	×	×	×	×
ECM	×	x*	—	—	—	×	—	—

*: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to [EC-465, "Fail Safe"](#).)

TWO TRIP DETECTION LOGIC

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not light up at this stage. <1st trip>

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. <2nd trip> The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC-468, "DTC Index" .)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

DTC AND FREEZE FRAME DATA

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]

DTC and 1st Trip DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not recur, the 1st trip DTC will not be displayed.

If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in “How to Erase DTC and 1st Trip DTC”.

For malfunctions in which 1st trip DTCs are displayed, refer to [EC-468, "DTC Index"](#). These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-III.

1st trip DTC is specified in Service \$07 of SAE J1979/ISO 15031-5. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a malfunction. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to [EC-15, "Work Flow"](#). Then perform DTC CONFIRMATION PROCEDURE or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

Freeze Frame Data and 1st Trip Freeze Frame Data

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short-term fuel trim, long-term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen, not on the GST.

Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in “How to Erase DTC and 1st Trip DTC”.

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

With CONSULT-III

CONSULT-III displays the DTC in “SELF DIAGNOSTIC RESULT” mode.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[HR16DE]

< FUNCTION DIAGNOSIS >

Examples: P0340, P0850, P1148, etc.

These DTCs are prescribed by SAE J2012/ISO 15031-6.

(CONSULT-III also displays the malfunctioning component or system.)

Time data indicates how many times the vehicle was driven after the last detection of a DTC.

If the DTC is being detected currently, the time data will be [0].

If a 1st trip DTC is stored in the ECM, the time data will be [1t].

With GST

GST (Generic Scan Tool) displays the DTC in Diagnostic Service \$03.

Examples: P0340, P0850, P1148, etc.

These DTCs are prescribed by SAE J2012/ISO 15031-6.

No Tools

The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC.

Example: 0340, 0850, 1148, etc.

These DTCs are controlled by NISSAN.

NOTE:

- 1st trip DTC No. is the same as DTC No.
- Output of a DTC indicates a malfunction. However, GST and the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-III can identify malfunction status. Therefore, using CONSULT-III (if available) is recommended.

How to Erase DTC and 1st Trip DTC

With CONSULT-III

NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
- If the DTC is not for A/T related items ([EC-468, "DTC Index"](#)), skip step 1.
 1. Erase DTC in TCM. Refer to [AT-39, "OBD-II Diagnostic Trouble Code \(DTC\)"](#).
 2. Select "ENGINE" with CONSULT-III.
 3. Select "SELF DIAGNOSTIC RESULT".
 4. Touch "ERASE". (DTC in ECM will be erased.)

With GST

NOTE:

If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.

1. Select Service \$04 with GST (Generic Scan Tool).

No Tools

NOTE:

If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.

1. Erase DTC in ECM. Refer to HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
- If the battery is disconnected, the emission-related diagnostic information will be cleared within 24 hours.
 - The following data are cleared when the ECM memory is erased.
 - Diagnostic trouble codes
 - 1st trip diagnostic trouble codes
 - Freeze frame data
 - 1st trip freeze frame data
 - System readiness test (SRT) codes
 - Test values

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Service \$01 of SAE J1979/ISO 15031-5.

As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.

If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating "INCMP", use the information in this Service Manual to set the SRT to "CMPLT".

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]

In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate "CMPLT" for each application system. Once set as "CMPLT", the SRT status remains "CMPLT" until the self-diagnosis memory is erased.

Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate "INCMP" for these items.

NOTE:

The SRT will also indicate "INCMP" if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.

If, during the state emissions inspection, the SRT indicates "CMPLT" for all test items, the inspector will continue with the emissions test. However, if the SRT indicates "INCMP" for one or more of the SRT items the vehicle is returned to the customer untested.

NOTE:

If permanent DTC is stored or MIL illuminates during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates "CMPLT" for all test items. Therefore, it is important to check SRT ("CMPLT"), DTC (No DTCs) and permanent DTC (No permanent DTCs) before the inspection.

SRT Item

The table below shows required self-diagnostic items to set the SRT to "CMPLT".

SRT item (CONSULT-III indication)	Performance Priority*	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420
EVAP SYSTEM	2	EVAP control system purge flow monitoring	P0441
	1	EVAP control system	P0442
	2	EVAP control system	P0456
HO2S	2	Air fuel ratio (A/F) sensor 1	P0133
		Heated oxygen sensor 2	P0137
		Heated oxygen sensor 2	P0138
		Heated oxygen sensor 2	P0139
EGR/VVT SYSTEM	3	Intake valve timing control function	P0011

*: If completion of several SRTs is required, perform driving patterns (DTC CONFIRMATION PROCEDURE), one by one based on the priority for models with CONSULT-III.

SRT Set Timing

SRT is set as "CMPLT" after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

Self-diagnosis result		Example							
		Diagnosis	Ignition cycle						
			← ON →	OFF	← ON →	OFF	← ON →	OFF	← ON →
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)			
		P0402	OK (1)	— (1)	— (1)	OK (2)			
		P1402	OK (1)	OK (2)	— (2)	— (2)			
		SRT of EGR	"CMPLT"	"CMPLT"	"CMPLT"	"CMPLT"			
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)			
		P0402	— (0)	— (0)	OK (1)	— (1)			
		P1402	OK (1)	OK (2)	— (2)	— (2)			
		SRT of EGR	"INCMP"	"INCMP"	"CMPLT"	"CMPLT"			

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]

NG exists	Case 3	P0400	OK	OK	—	—
		P0402	—	—	—	—
		P1402	NG	—	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MIL ON)
		SRT of EGR	"INCMP"	"INCMP"	"INCMP"	"CMPLT"

OK: Self-diagnosis is carried out and the result is OK.

NG: Self-diagnosis is carried out and the result is NG.

—: Self-diagnosis is not carried out.

When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate "CMPLT". → Case 1 above

When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate "CMPLT" at the time the respective self-diagnoses have at least one OK result. → Case 2 above

If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate "CMPLT". → Case 3 above

The table above shows that the minimum number of cycles for setting SRT as "INCMP" is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

- The SRT will indicate "CMPLT" at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires "CMPLT" of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to "CMPLT" of SRT, the self-diagnosis memory must be erased from ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate "INCMP".

NOTE:

SRT can be set as "CMPLT" together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates "CMPLT".

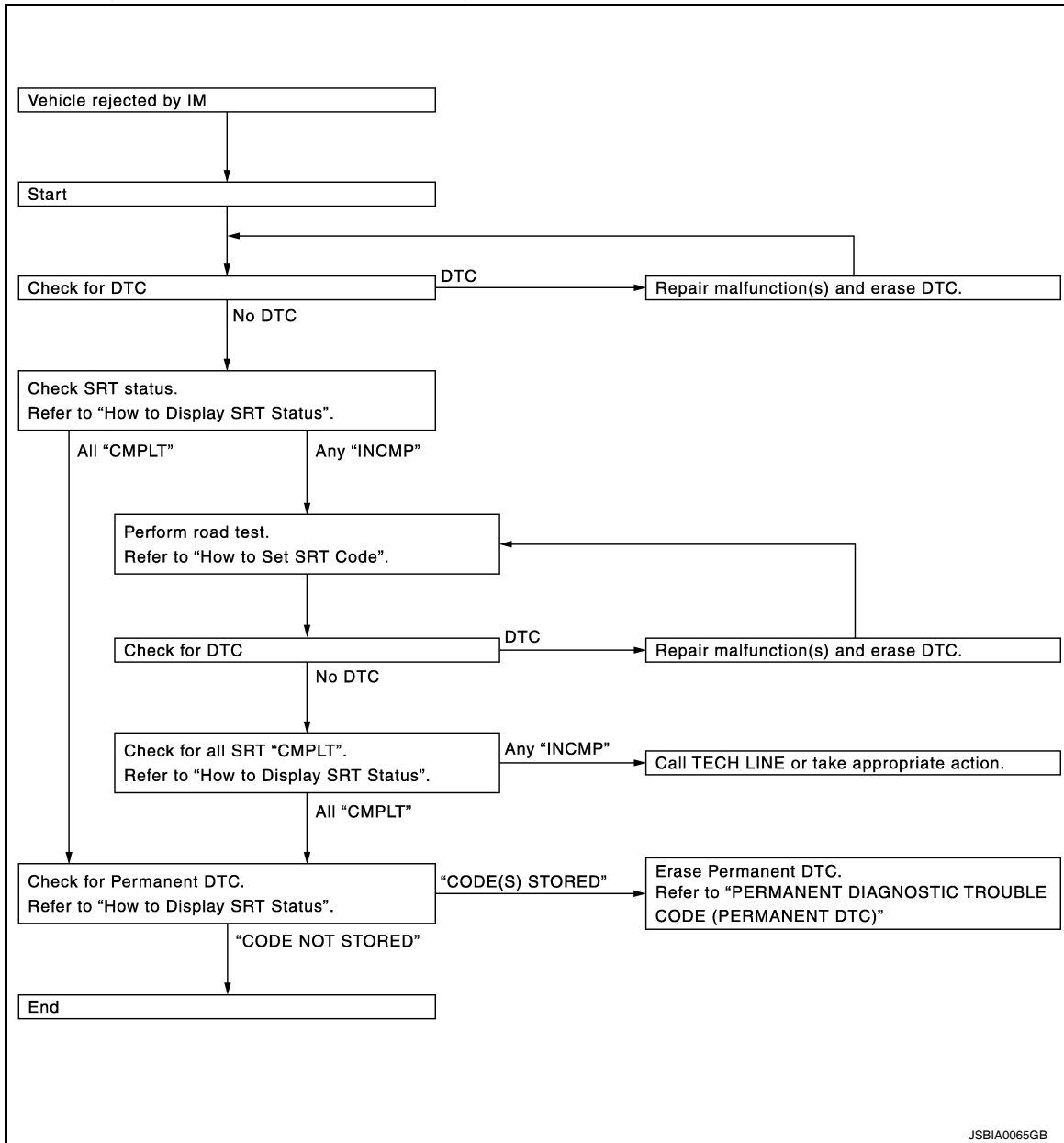
SRT Service Procedure

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[HR16DE]

< FUNCTION DIAGNOSIS >

If a vehicle has failed the state emissions inspection due to one or more SRT items indicating "INCMP", review the flowchart diagnostic sequence on the next figure.



How to Display SRT Status

WITH CONSULT-III

Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-III.

For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT-III screen; for items whose SRT codes are not set, "INCMP" is displayed.

NOTE:

- Though displayed on the CONSULT-III screen, "HO2S HTR" is not SRT item.
- "SRT STATUS" provides the presence or absence of permanent DTCs stored in ECM memory.

WITH GST

Selecting Service \$01 with GST (Generic Scan Tool)

NO TOOLS

A SRT code itself can not be displayed while only SRT status can be.

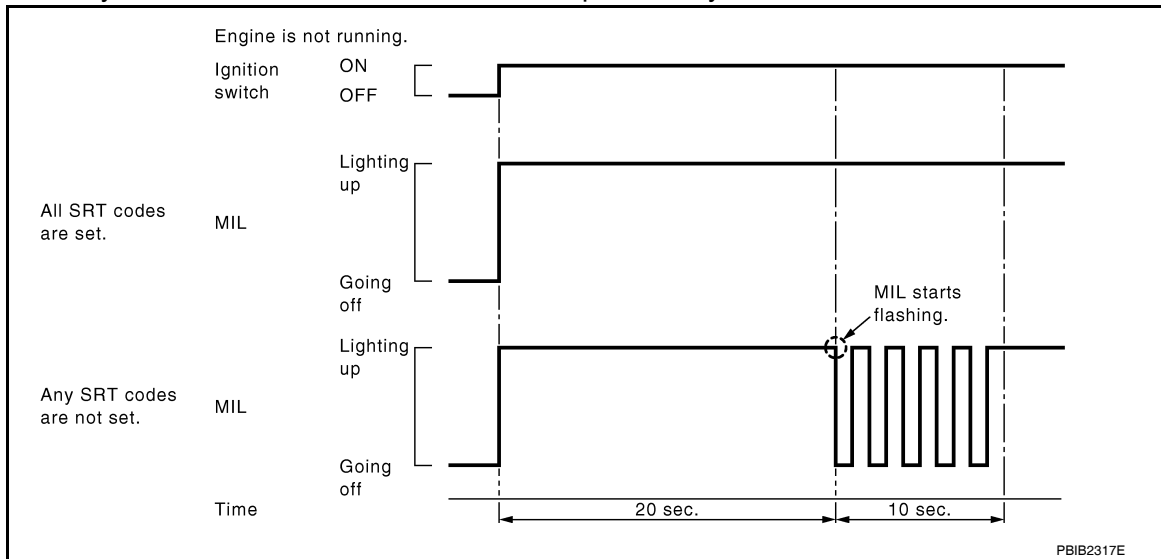
1. Turn ignition switch ON and wait 20 seconds.
2. SRT status is indicated as shown below.
 - When all SRT codes are set, MIL lights up continuously.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[HR16DE]

< FUNCTION DIAGNOSIS >

- When any SRT codes are not set, MIL will flash periodically for 10 seconds.



PERMANENT DIAGNOSTIC TROUBLE CODE (PERMANENT DTC)

Permanent DTC is defined in SAE J1979/ISO 15031-5 Service \$0A.

ECM stores a DTC issuing a command of turning on MIL as a permanent DTC and keeps storing the DTC as a permanent DTC until ECM judges that there is no presence of malfunction.

Permanent DTCs cannot be erased by using the Erase function of CONSULT-III or Generic Scan Tool (GST) and by disconnecting the battery to shut off power to ECM. This prevents a vehicle from passing the state emission inspection without repairing a malfunctioning part.

When not passing the state emission inspection due to more than one permanent DTC, permanent DTCs should be erased, referring to this manual.

NOTE:

- The important items in state emission inspection are that MIL is not ON, SRT test items are set, and permanent DTCs are not included.
- Permanent DTCs do not apply for regions that permanent DTCs are not regulated by law.

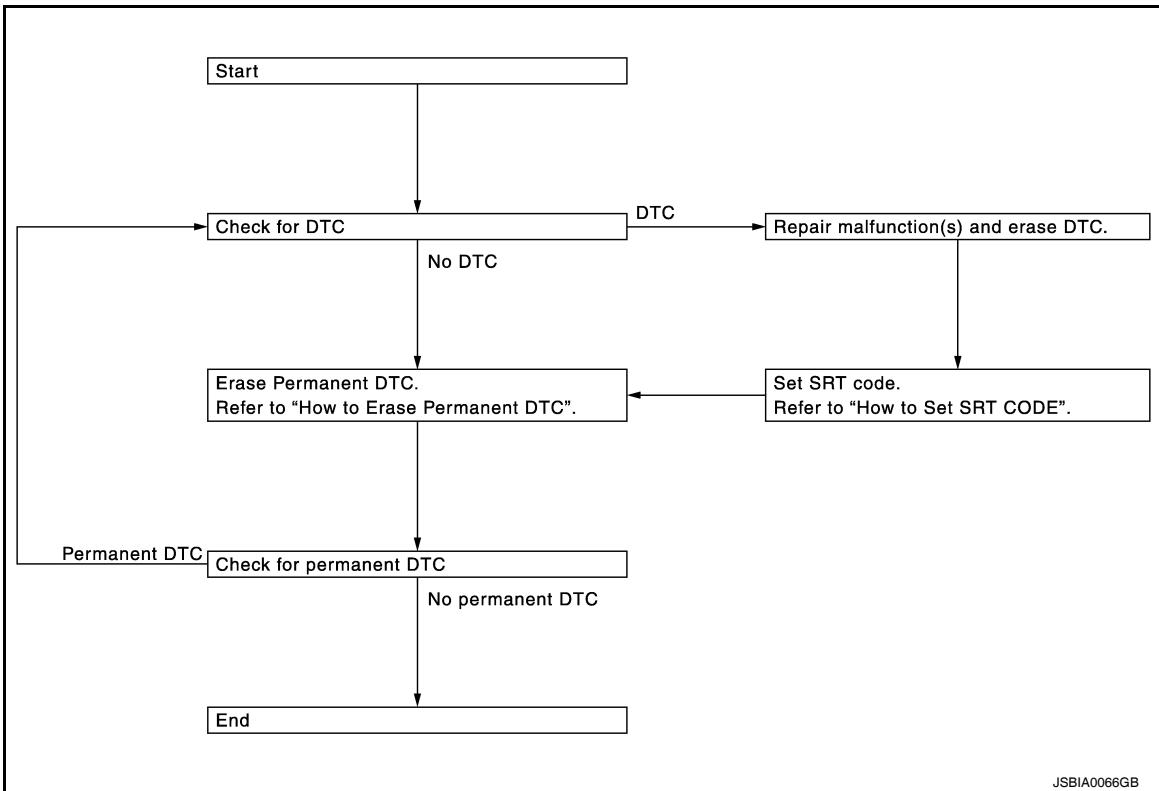
Permanent DTC Item

For permanent DTC items, MIL turns on. Refer to [EC-468. "DTC Index"](#).

Permanent DTC Set Timing

The setting timing of permanent DTC is stored in ECM with the lighting of MIL when a DTC is confirmed.

Permanent DTC Service Procedure



How to Display Permanent DTC Status

WITH CONSULT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select "PERMANENT DTC STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT-III.

NOTE:

Permanent DTCs stored in ECM memory are displayed on the CONSULT-III screen to show if a driving pattern required for erasing permanent DTCs is complete (CMPLT) or incomplete (INCMP).

CAUTION:

Since the "PERMANENT DTC STATUS" screen displays the previous trip information, repeat the following twice to update the information: "Ignition switch OFF", "Wait for more than 10 seconds" and "Ignition switch ON".

PERMANENT DTC & SRT CONFIRMATION : PERMANENT DTC STATUS		
<p>CAUTION: Turn ignition switch from ON to OFF twice to update the information on the status screen.</p>		
PERMANENT DTC	DRIVING PATTERN B	DRIVING PATTERN D
XXXX	INCMP	INCMP
XXXX	CMPLT	INCMP
XXXX	INCMP	CMPLT
XXXX	CMPLT	INCMP
XXXX	INCMP	INCMP
XXXX	INCMP	INCMP
<p>The previous trip information is displayed. </p>		

JSBIA0062GB

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[HR16DE]

< FUNCTION DIAGNOSIS >

WITH GST

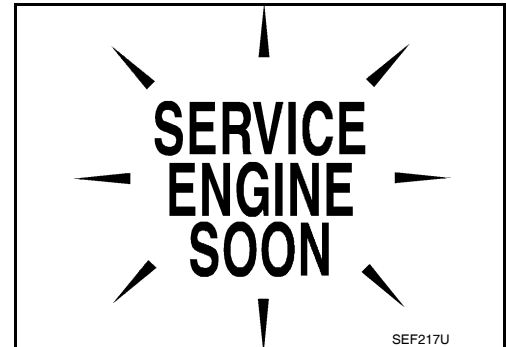
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select Service \$0A with GST (Generic Scan Tool).

MALFUNCTION INDICATOR LAMP (MIL)

Description






The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
If the MIL does not light up, refer to [EC-439, "Component Function Check"](#).
2. When the engine is started, the MIL should go off.
If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.



On Board Diagnostic System Function

The on board diagnostic system has the following three functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped 	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
	Engine running 	MALFUNCTION WARNING	When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. <ul style="list-style-type: none"> • Misfire (Possible three way catalyst damage) • One trip detection diagnoses
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.

Diagnostic Test Mode I — Bulb Check

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to [EC-439, "Description"](#).

Diagnostic Test Mode I — Malfunction Warning

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< FUNCTION DIAGNOSIS >

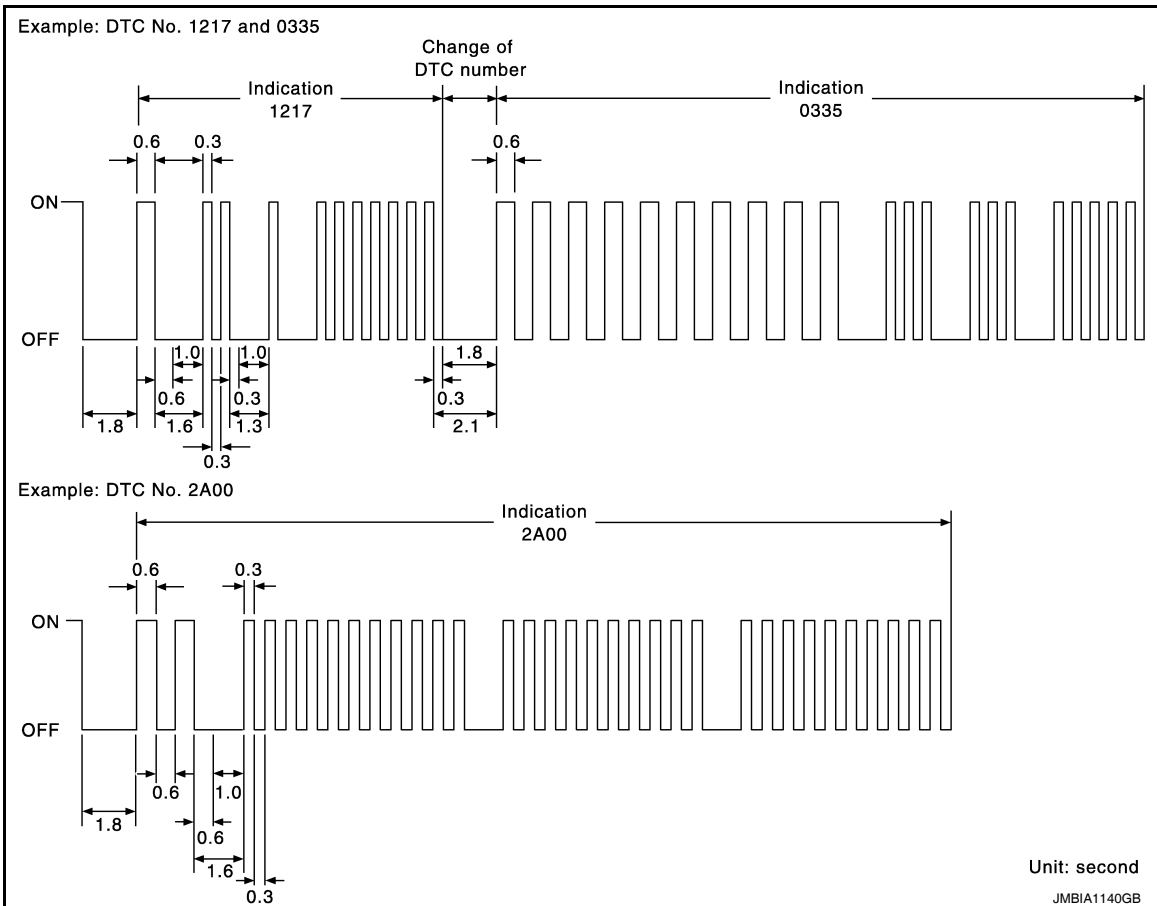
[HR16DE]

MIL	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

This DTC number is clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

Diagnostic Test Mode II — Self-diagnostic Results

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MIL as shown below. The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT-III or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes as per the following.

Number	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Flashes	10	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16

The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-seconds) - OFF (0.6-seconds) cycle.

The 100th-digit numeral and lower digit numerals consist of a 0.3-seconds ON and 0.3-seconds OFF cycle.

A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.

A change from one trouble code to another occurs at an interval of 1.8-seconds OFF.

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See [EC-468. "DTC Index"](#))

How to Switch Diagnostic Test Mode

NOTE:

- It is better to count the time accurately with a clock.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[HR16DE]

< FUNCTION DIAGNOSIS >

- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.

HOW TO SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.
 - Fully depress the accelerator pedal.
 - Fully release the accelerator pedal.
3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL starts blinking.

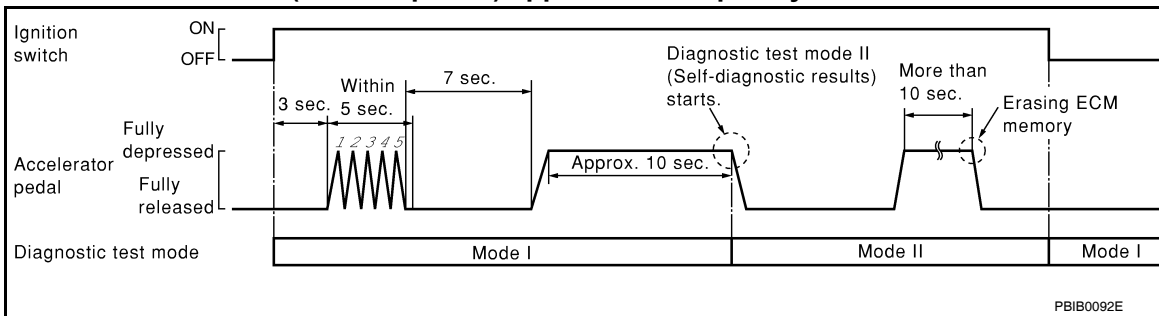
NOTE:

Do not release the accelerator pedal for 10 seconds if MIL start blinking during this period. This blinking is displaying SRT status and is continued for another 10 seconds.

4. Fully release the accelerator pedal.
ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).

NOTE:

Wait until the same DTC (or 1st trip DTC) appears to completely confirm all DTCs.



HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to "HOW TO SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)".
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

OBD System Operation Chart

Relationship Between MIL, 1st Trip DTC, DTC and Detectable Items

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on.
- The MIL will go off after the vehicle is driven 3 times (driving pattern B) with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The "TIME" in "SELF DIAGNOSTIC RESULT" mode of CONSULT-III will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

Summary Chart

Items	Fuel Injection System	Misfire	Other
MIL (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[HR16DE]

< FUNCTION DIAGNOSIS >

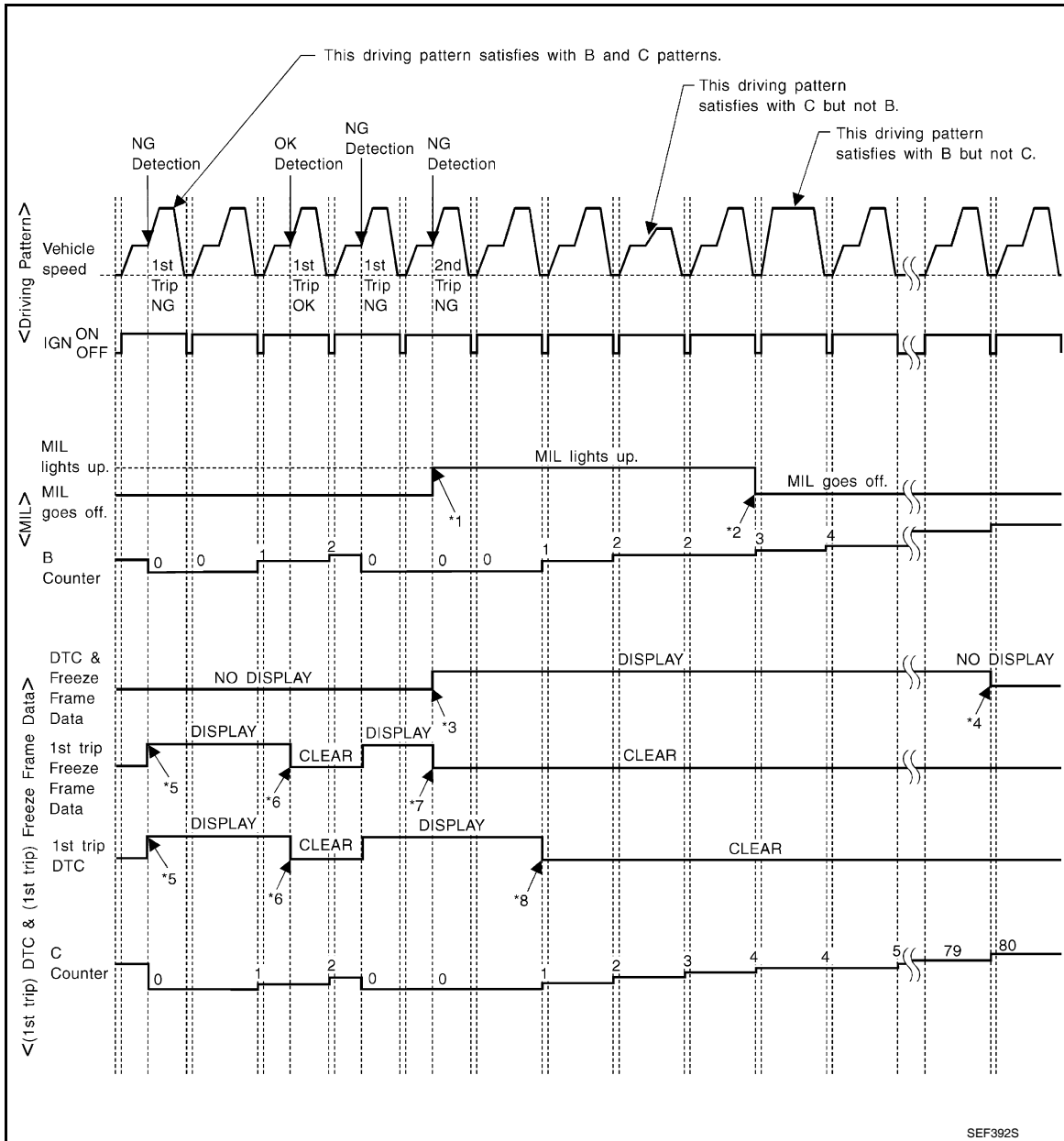
For details about patterns B and C under “Fuel Injection System” and “Misfire”, see “EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”.

For details about patterns A and B under Other, see “EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”.

*1: Clear timing is at the moment OK is detected.

*2: Clear timing is when the same malfunction is detected in the 2nd trip.

Relationship Between MIL, DTC, 1st Trip DTC and Driving Patterns for “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System”



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[HR16DE]

< FUNCTION DIAGNOSIS >

- | | | |
|--|---|---|
| *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.) | *5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM. | *6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected. |
| *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared. | *8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM. | |

Explanation for Driving Patterns for "Misfire <Exhaust Quality Deterioration>", "Fuel Injection System"

<Driving Pattern B>

Driving pattern B means the vehicle operation as per the following:

All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunction.
- The MIL will go off when the B counter reaches 3. (*2 in "OBD SYSTEM OPERATION CHART")

<Driving Pattern C>

Driving pattern C means the vehicle operation as per the following:

The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data) \pm 375 rpm

Calculated load value: (Calculated load value in the freeze frame data) \times (1 \pm 0.1) [%]

Engine coolant temperature (T) condition:

- When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).

Example:

If the stored freeze frame data is as per the following:

Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)

To be satisfied with driving pattern C, the vehicle should run under the following conditions:

Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

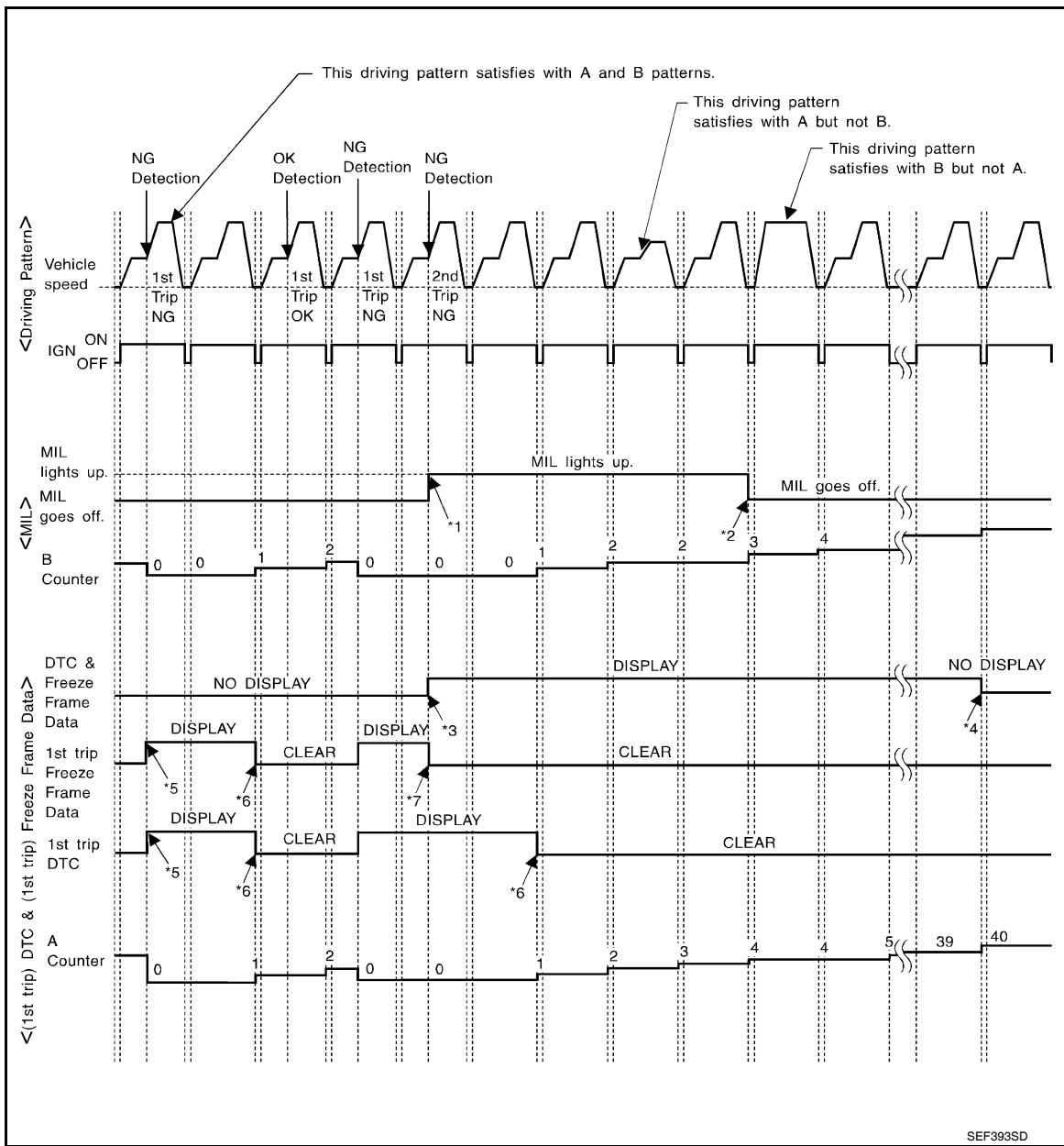
- The C counter will be cleared when the malfunction is detected regardless of vehicle conditions above.
- The C counter will be counted up when vehicle conditions above is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

Relationship Between MIL, DTC, 1st Trip DTC and Driving Patterns Except For "Misfire <Exhaust Quality Deterioration>", "Fuel Injection System"

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

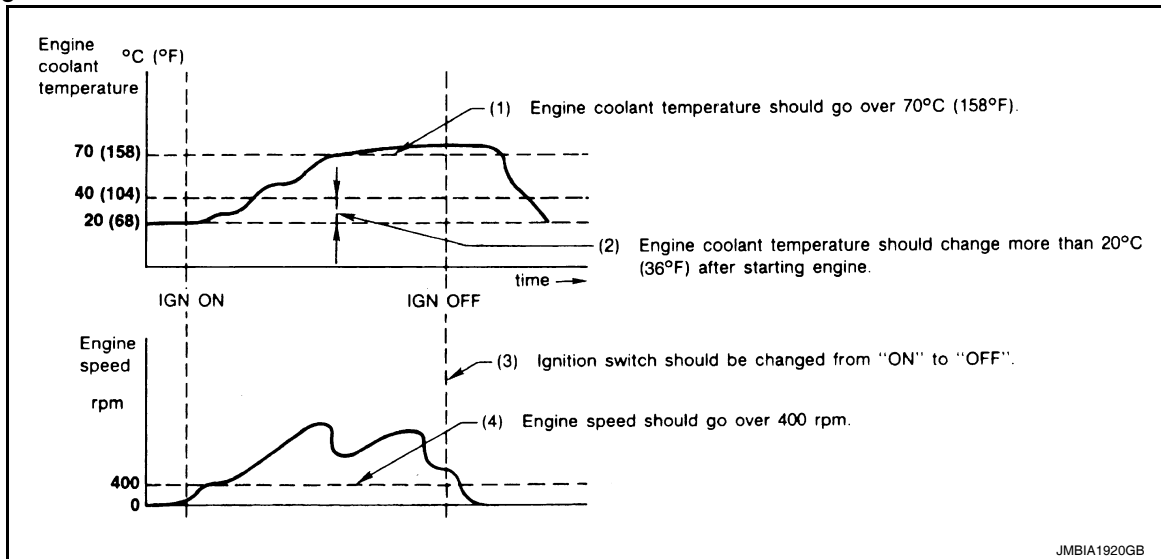
Explanation for Driving Patterns Except for "Misfire <Exhaust Quality Deterioration>", "Fuel Injection System"

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[HR16DE]

< FUNCTION DIAGNOSIS >

<Driving Pattern A>



- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>

Driving pattern B means the vehicle operation as per the following:

All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will go off when the B counter reaches 3 (*2 in OBD SYSTEM OPERATION CHART).

CONSULT-III Function

INFOID:000000005398278

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-III screen.
Self diagnostic result	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
Active test	Diagnostic Test Mode in which CONSULT-III drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/results can be confirmed.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECU Identification	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

WORK SUPPORT MODE

Work Item

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	<ul style="list-style-type: none"> FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS. 	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	<ul style="list-style-type: none"> THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM. 	When learning the idle air volume
SELF-LEARNING CONT	<ul style="list-style-type: none"> THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT. 	When clearing mixture ratio self-learning value
EVAP SYSTEM CLOSE	<p>CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS.</p> <ul style="list-style-type: none"> IGN SW ON ENGINE NOT RUNNING AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM FUEL TANK TEMP. IS MORE THAN 0°C (32°F). WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE" WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITION EXCEPT ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. <p>NOTE: WHEN STARTING ENGINE, CONSULT-III MAY DISPLAY "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", EVEN IN USING CHARGED BATTERY.</p>	When detecting EVAP vapor leak point of EVAP system
VIN REGISTRATION	<ul style="list-style-type: none"> IN THIS MODE, VIN IS REGISTERED IN ECM. 	When registering VIN in ECM
TARGET IDLE RPM ADJ*	<ul style="list-style-type: none"> IDLE CONDITION 	When setting target idle speed
TARGET IGN TIM ADJ*	<ul style="list-style-type: none"> IDLE CONDITION 	When adjusting target ignition timing

*: This function is not necessary in the usual service procedure.

SELF DIAGNOSTIC RESULT MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to [EC-468, "DTC Index".](#))

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	<ul style="list-style-type: none"> The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to EC-468, "DTC Index".)
FUEL SYS-B1	<ul style="list-style-type: none"> "Fuel injection system status" at the moment a malfunction is detected is displayed. One mode in the following is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enrichment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	<ul style="list-style-type: none"> The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	<ul style="list-style-type: none"> The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	<ul style="list-style-type: none"> "Long-term fuel trim" at the moment a malfunction is detected is displayed. The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]

Freeze frame data item*	Description
S-FUEL TRM-B1 [%]	<ul style="list-style-type: none"> • “Short-term fuel trim” at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	<ul style="list-style-type: none"> • The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	<ul style="list-style-type: none"> • The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH·P/S [%]	<ul style="list-style-type: none"> • The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	<ul style="list-style-type: none"> • The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	<ul style="list-style-type: none"> • The intake air temperature at the moment a malfunction is detected is displayed.
FUEL SYS-B2	<ul style="list-style-type: none"> • These items displayed but are not applicable to this model.
L-FUEL TRM-B2 [%]	
S-FUEL TRM-B2 [%]	
INT MANI PRES [kPa]	
COMBUST CONDI-TION	

*: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE

Monitored Item

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	<ul style="list-style-type: none"> • Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE). 	<ul style="list-style-type: none"> • Accuracy becomes poor if engine speed drops below the idle rpm. • If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1	V	<ul style="list-style-type: none"> • The signal voltage of the mass air flow sensor is displayed. 	<ul style="list-style-type: none"> • When the engine is stopped, a certain value is indicated. • When engine is running specification range is indicated in “SPEC”.
B/FUEL SCHDL	ms	<ul style="list-style-type: none"> • “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 	<ul style="list-style-type: none"> • When engine is running specification range is indicated in “SPEC”.
A/F ALPHA-B1	%	<ul style="list-style-type: none"> • The mean value of the air-fuel ratio feedback correction factor per cycle is indicated. 	<ul style="list-style-type: none"> • When the engine is stopped, a certain value is indicated. • This data also includes the data for the air-fuel ratio learning control. • When engine is running specification range is indicated in “SPEC”.
COOLAN TEMP/S	°C or °F	<ul style="list-style-type: none"> • The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed. 	<ul style="list-style-type: none"> • When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
A/F SEN1 (B1)	V	<ul style="list-style-type: none"> • The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed. 	
HO2S2 (B1)	V	<ul style="list-style-type: none"> • The signal voltage of the heated oxygen sensor 2 is displayed. 	

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]

Monitored item	Unit	Description	Remarks
HO2S2 MNTR(B1)	RICH/ LEAN	<ul style="list-style-type: none"> Display of heated oxygen sensor 2 signal: RICH: means the amount of oxygen after three way catalyst is relatively small. LEAN: means the amount of oxygen after three way catalyst is relatively large. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
VHCL SPEED SE	km/h or mph	<ul style="list-style-type: none"> The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed. 	
BATTERY VOLT	V	<ul style="list-style-type: none"> The power supply voltage of ECM is displayed. 	
ACCEL SEN 1	V	<ul style="list-style-type: none"> The accelerator pedal position sensor signal voltage is displayed. 	<ul style="list-style-type: none"> ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2			
TP SEN 1-B1	V	<ul style="list-style-type: none"> The throttle position sensor signal voltage is displayed. 	<ul style="list-style-type: none"> TP SEN 2-B1 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
TP SEN 2-B1			
FUEL T/TMP SE	°C or °F	<ul style="list-style-type: none"> The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed. 	
INT/A TEMP SE	°C or °F	<ul style="list-style-type: none"> The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated. 	
EVAP SYS PRES	V	<ul style="list-style-type: none"> The signal voltage of EVAP control system pressure sensor is displayed. 	
FUEL LEVEL SE	V	<ul style="list-style-type: none"> The signal voltage of the fuel level sensor is displayed. 	
START SIGNAL	ON/OFF	<ul style="list-style-type: none"> Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage. 	<ul style="list-style-type: none"> After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS	ON/OFF	<ul style="list-style-type: none"> Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal. 	
AIR COND SIG	ON/OFF	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of the air conditioner switch determined by the air conditioner ON signal. 	
P/N POSI SW	ON/OFF	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the park/neutral position (PNP) signal. 	
PW/ST SIGNAL	ON/OFF	<ul style="list-style-type: none"> [ON/OFF] condition of the power steering system (determined by the signal sent from EPS control unit) is indicated. 	
LOAD SIGNAL	ON/OFF	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF. 	
IGNITION SW	ON/OFF	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from ignition switch signal. 	
HEATER FAN SW	ON/OFF	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the heater fan switch signal. 	
BRAKE SW	ON/OFF	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the stop lamp switch signal. 	
INJ PULSE-B1	msec	<ul style="list-style-type: none"> Indicates the actual fuel injection pulse width compensated by ECM according to the input signals. 	<ul style="list-style-type: none"> When the engine is stopped, a certain computed value is indicated.
IGN TIMING	BTDC	<ul style="list-style-type: none"> Indicates the ignition timing computed by ECM according to the input signals. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
CAL/LD VALUE	%	<ul style="list-style-type: none"> "Calculated load value" indicates the value of the current air flow divided by peak air flow. 	
MASS AIRFLOW	g·m/s	<ul style="list-style-type: none"> Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow sensor. 	

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]

Monitored item	Unit	Description	Remarks
PURG VOL C/V	%	<ul style="list-style-type: none"> Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. The opening becomes larger as the value increases. 	
INT/V TIM(B1)	°CA	<ul style="list-style-type: none"> Indicates [°CA] of intake camshaft advance angle. 	
INT/V SOL(B1)	%	<ul style="list-style-type: none"> The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. The advance angle becomes larger as the value increases. 	
AIR COND RLY	ON/OFF	<ul style="list-style-type: none"> The air conditioner relay control condition (determined by ECM according to the input signals) is indicated. 	
FUEL PUMP RLY	ON/OFF	<ul style="list-style-type: none"> Indicates the fuel pump relay control condition determined by ECM according to the input signals. 	
VENT CONT/V	ON/OFF	<ul style="list-style-type: none"> The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. ON: Closed OFF: Open 	
THRTL RELAY	ON/OFF	<ul style="list-style-type: none"> Indicates the throttle control motor relay control condition determined by the ECM according to the input signals. 	
COOLING FAN	HI/LOW/OFF	<ul style="list-style-type: none"> Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI: High speed operation LOW: Low speed operation OFF: Stop 	
HO2S2 HTR (B1)	ON/OFF	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals. 	
I/P PULLY SPD	rpm	<ul style="list-style-type: none"> Indicates the engine speed computed from the primary speed sensor signal. 	
VEHICLE SPEED	km/h or mph	<ul style="list-style-type: none"> The vehicle speed computed from the vehicle speed signal sent from TCM is displayed. 	
IDL A/V LEARN	YET/CM-PLT	<ul style="list-style-type: none"> Display the condition of Idle Air Volume Learning YET: Idle air volume learning has not been performed yet. CMPLT: Idle air volume learning has already been performed successfully. 	
TRVL AFTER MIL	km or mile	<ul style="list-style-type: none"> Distance traveled while MIL is activated. 	
A/F S1 HTR(B1)	%	<ul style="list-style-type: none"> Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals. The current flow to the heater becomes larger as the value increases. 	
AC PRESS SEN	V	<ul style="list-style-type: none"> The signal voltage from the refrigerant pressure sensor is displayed. 	
A/F ADJ-B1	—	<ul style="list-style-type: none"> Indicates the correction of factor stored in ECM. The factor is calculated from the difference between the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 signal. 	
HO2 S2 DIAG2 (B1)* [INCMP/CMPLT]	—	<ul style="list-style-type: none"> Indicates DTC P0139 self-diagnosis (slow response) INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	

*: The item is indicated, but not used.

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the amount of fuel injection using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connectors Fuel injector Air fuel ratio (A/F) sensor 1
IGNITION TIMING	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Timing light: Set Retard the ignition timing using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Perform Idle Air Volume Learning.
POWER BALANCE	<ul style="list-style-type: none"> Engine: After warming up, idle the engine. A/C switch OFF Selector lever: P or N position (A/T), Neutral position (M/T) Cut off each fuel injector signal one at a time using CONSULT-III. 	Engine runs rough or dies.	<ul style="list-style-type: none"> Harness and connectors Compression Fuel injector Power transistor Spark plug Ignition coil
COOLING FAN*	<ul style="list-style-type: none"> Ignition switch: ON Turn the cooling fan "LOW", "HI" and "OFF" using CONSULT-III. 	Cooling fan moves and stops.	<ul style="list-style-type: none"> Harness and connectors IPDM E/R (Cooling fan relay) Cooling fan motor
ENG COOLANT TEMP	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the engine coolant temperature using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connectors Engine coolant temperature sensor Fuel injector
FUEL PUMP RELAY	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Turn the fuel pump relay "ON" and "OFF" using CONSULT-III and listen to operating sound. 	Fuel pump relay makes the operating sound.	<ul style="list-style-type: none"> Harness and connectors Fuel pump relay
PURG VOL CONT/V	<ul style="list-style-type: none"> Engine: After warming up, run engine at 1,500 rpm. Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-III. 	Engine speed changes according to the opening percent.	<ul style="list-style-type: none"> Harness and connectors Solenoid valve
FUEL/T TEMP SEN	<ul style="list-style-type: none"> Change the fuel tank temperature using CONSULT-III. 		
VENT CONTROL/V	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Turn solenoid valve "ON" and "OFF" using the CONSULT-III and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> Harness and connectors Solenoid valve
V/T ASSIGN ANGLE	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change intake valve timing using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connectors Intake valve timing control solenoid valve

*: Leaving cooling fan OFF with CONSULT-III while engine is running may cause the engine to overheat.

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to [EC-84, "Diagnosis Description"](#).

PERMANENT DTC STATUS Mode

For details, refer to [EC-84, "Diagnosis Description"](#).

NOTE:

This mode is not used in regions that permanent DTCs are not regulated by law.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[HR16DE]

< FUNCTION DIAGNOSIS >

SRT WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

PERMANENT DTC WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to complete the driving pattern that is required for erasing permanent DTC.

NOTE:

This mode is not used in regions that permanent DTCs are not regulated by law.

DTC WORK SUPPORT Mode

Test mode	Test item	Corresponding DTC No.	Reference page
EVAPORATIVE SYSTEM	EVP SML LEAK P0442/P1442*	P0442	EC-278
		P0455	EC-323
	EVP V/S LEAK P0456/P1456*	P0456	EC-329
A/F SEN1	A/F SEN1 (B1) P1278/P1279	P0133	EC-192
	A/F SEN1 (B1) P1276	P0130	EC-176
HO2S2	HO2S2 (B1) P1146	P0138	EC-206
	HO2S2 (B1) P1147	P0137	EC-198
	HO2S2 (B1) P139	P0139	EC-215

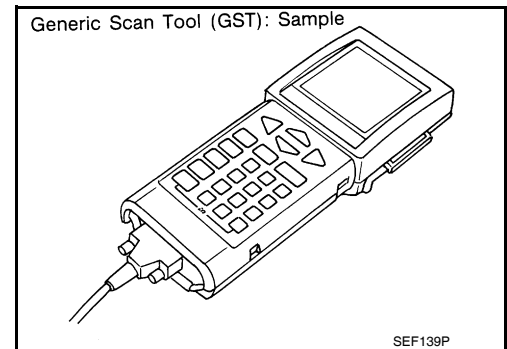
*: DTC P1442 and P1456 does not apply to C11 models but appears in DTC Work Support Mode screens.

Diagnosis Tool Function

INFOID:000000005398279

DESCRIPTION

Generic Scan Tool (OBD II scan tool) complying with SAE J1978/ISO 15031-4 has several functions explained below. ISO15765-4 is used as the protocol. The name "GST" or "Generic Scan Tool" is used in this service manual.



FUNCTION

Diagnostic Service		Function
Service \$01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
Service \$02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-468 . "DTC Index".
Service \$03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.
Service \$04	CLEAR DIAG INFO	This diagnostic service can clear all emission-related diagnostic information. This includes: <ul style="list-style-type: none"> • Clear number of diagnostic trouble codes (Service \$01) • Clear diagnostic trouble codes (Service \$03) • Clear trouble code for freeze frame data (Service \$01) • Clear freeze frame data (Service \$02) • Reset status of system monitoring test (Service \$01) • Clear on board monitoring test results (Service \$06 and \$07)
Service \$06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< FUNCTION DIAGNOSIS >

[HR16DE]

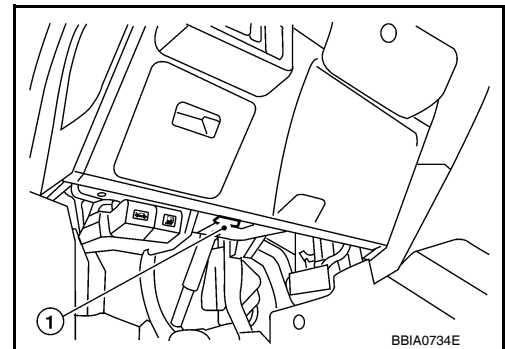
Diagnostic Service		Function
Service \$07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
Service \$08	—	This diagnostic service can close EVAP system in ignition switch ON position (Engine stopped). When this diagnostic service is performed, EVAP canister vent control valve can be closed. In the following conditions, this diagnostic service cannot function. <ul style="list-style-type: none"> • Low ambient temperature • Low battery voltage • Engine running • Ignition switch OFF • Low fuel temperature • Too much pressure is applied to EVAP system
Service \$09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.
Service \$0A*	PERMANENT DTCs	This diagnostic service gains access to permanent DTCs which were stored by ECM.

NOTE:

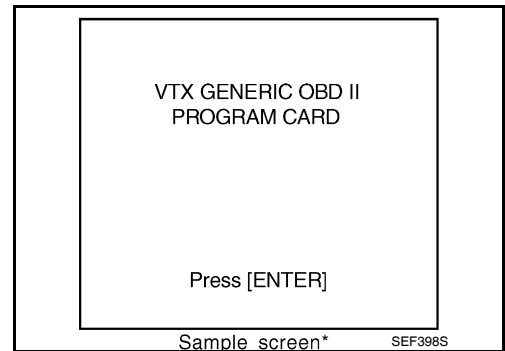
*: Service \$0A is not applied for regions where it is not mandated.

INSPECTION PROCEDURE

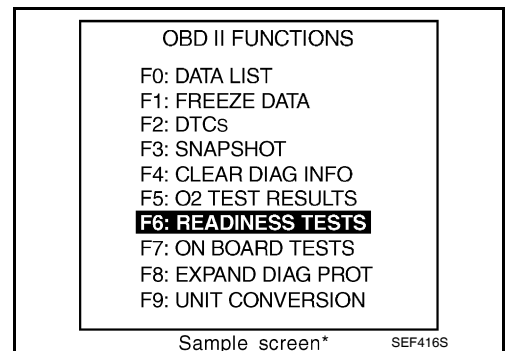
1. Turn ignition switch OFF.
2. Connect "GST" to data link connector (1), which is located under LH dash panel.
3. Turn ignition switch ON.



4. Enter the program according to instruction on the screen or in the operation manual.
(*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic mode according to each service procedure.
For further information, see the GST Operation Manual of the tool maker.



A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

COMPONENT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:000000005398280

The specification (SP) value indicates the tolerance of the value that is displayed in "SPEC" of "DATA MONITOR" mode of CONSULT-III during normal operation of the Engine Control System. When the value in "SPEC" of "DATA MONITOR" mode is within the SP value, the Engine Control System is confirmed OK. When the value in "SPEC" of "DATA MONITOR" mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.

The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.

The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Component Function Check

INFOID:000000005398281

1. START

Make sure that all of the following conditions are satisfied.

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm², 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up
 - A/T models: After the engine is warmed up to normal operating temperature, drive vehicle until "FLUID TEMP SE" (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
 - M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied
 - Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.
- Engine speed: Idle

>> GO TO 2.

2. PERFORM "SPEC" OF "DATA MONITOR" MODE

With CONSULT-III

NOTE:

Perform "SPEC" in "DATA MONITOR" mode in maximum scale display.

1. Perform [EC-20. "BASIC INSPECTION : Special Repair Requirement"](#).
2. Select "B/FUEL SCHDL", "A/F ALPHA-B1" and "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode with CONSULT-III.
3. Make sure that monitor items are within the SP value.

Is the inspection result normal?

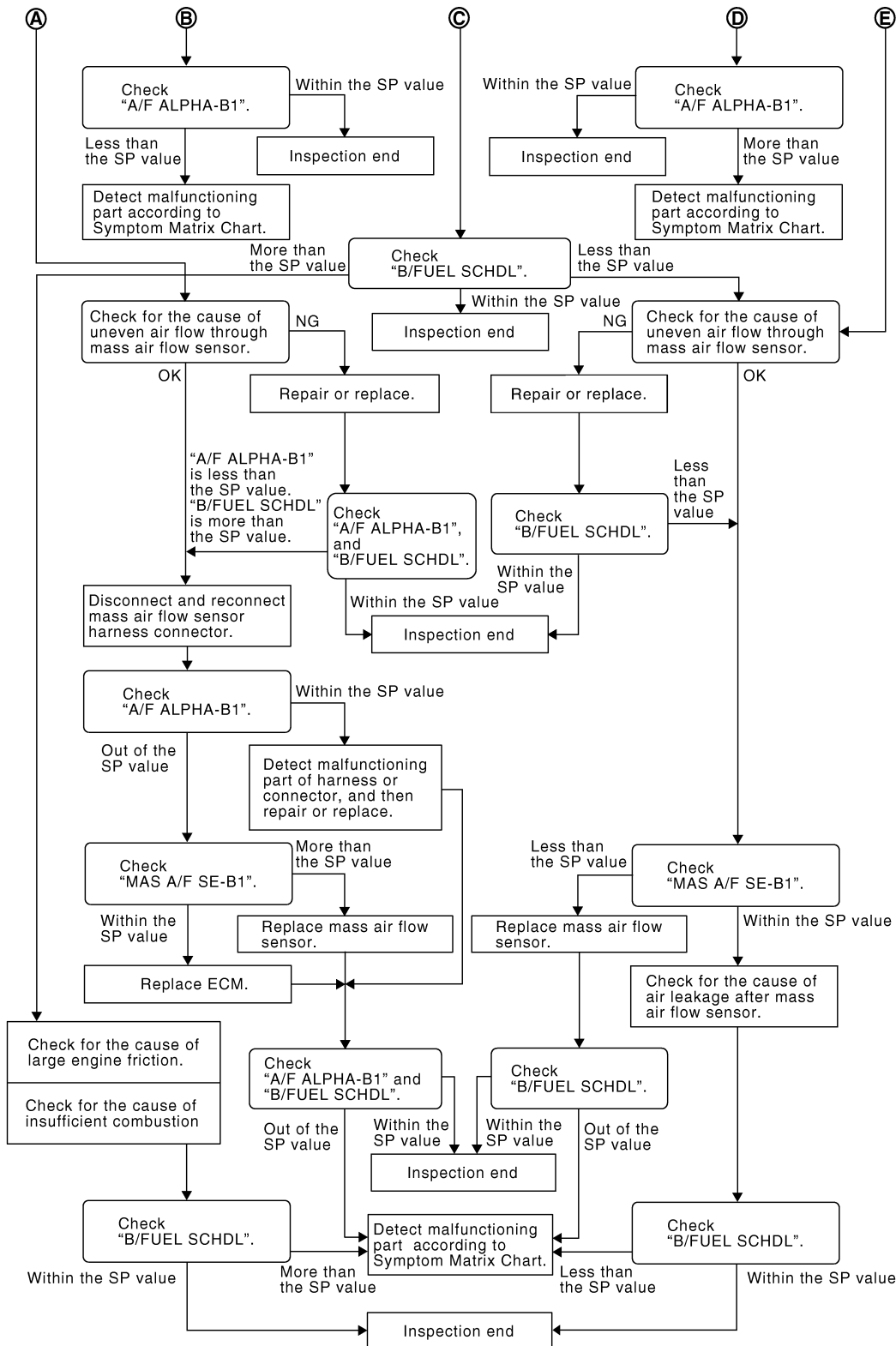
YES >> END

NO >> Go to [EC-107. "Diagnosis Procedure"](#).

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< COMPONENT DIAGNOSIS >

[HR16DE]



PBIB3213E

DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1"

ⓑ With CONSULT-III

1. Start engine.
2. Confirm that the testing conditions are met. Refer to [EC-106, "Component Function Check"](#).
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< COMPONENT DIAGNOSIS >

[HR16DE]

NOTE:

Check "A/F ALPHA-B1" for approximately 1 minute because it may fluctuate. It is NG if the indication is out of the SP value even a little.

Is the measurement value within the SP value?

YES >> GO TO 17.

NO-1 >> Less than the SP value: GO TO 2.

NO-2 >> More than the SP value: GO TO 3.

2.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 4.

NO >> More than the SP value: GO TO 19.

3.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 6.

NO-1 >> More than the SP value: GO TO 6.

NO-2 >> Less than the SP value: GO TO 25.

4.CHECK "A/F ALPHA-B1"

1. Stop the engine.
2. Disconnect PCV hose, and then plug it.
3. Start engine.
4. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 5.

NO >> GO TO 6.

5.CHANGE ENGINE OIL

1. Stop the engine.
2. Change engine oil.

NOTE:

This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving conditions (such as when engine oil temperature does not rise enough since a journey distance is too short during winter). The symptom will not be detected after changing engine oil or changing driving condition.

>> INSPECTION END

6.CHECK FUEL PRESSURE

Check fuel pressure. (Refer to [EC-496, "Inspection"](#).)

Is the inspection result normal?

YES >> GO TO 9.

NO-1 >> Fuel pressure is too high: Replace "fuel filter and fuel pump assembly" and then GO TO 8.

NO-2 >> Fuel pressure is too low: GO TO 7.

7.DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly" and then GO TO 8.

NO >> Repair or replace and then GO TO 8.

8.CHECK "A/F ALPHA-B1"

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[HR16DE]

< COMPONENT DIAGNOSIS >

1. Start engine.
2. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

- YES >> INSPECTION END
NO >> GO TO 9.

9.PERFORM POWER BALANCE TEST

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Make sure that the each cylinder produces a momentary engine speed drop.

Is the inspection result normal?

- YES >> GO TO 12.
NO >> GO TO 10.

10.DETECT MALFUNCTIONING PART

Check the following.

1. Ignition coil and its circuit (Refer to [EC-432, "Component Function Check"](#).)
2. Fuel injector and its circuit (Refer to [EC-423, "Component Function Check"](#).)
3. Intake air leakage
4. Low compression pressure (Refer to [EM-23, "Inspection"](#).)

Is the inspection result normal?

- YES >> Replace fuel injector and then GO TO 11.
NO >> Repair or replace malfunctioning part and then GO TO 11.

11.CHECK "A/F ALPHA-B1"

1. Start engine.
2. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

- YES >> INSPECTION END
NO >> GO TO 12.

12.CHECK A/F SENSOR 1 FUNCTION

Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1.

- For DTC P0130, refer to [EC-176, "DTC Logic"](#).
- For DTC P0131, refer to [EC-182, "DTC Logic"](#).
- For DTC P0132, refer to [EC-187, "DTC Logic"](#).
- For DTC P0133, refer to [EC-192, "DTC Logic"](#).
- For DTC P2A00, refer to [EC-410, "DTC Logic"](#).

Is any DTC detected?

- YES >> GO TO 15.
NO >> GO TO 13.

13.CHECK A/F SENSOR 1 CIRCUIT

Perform DIAGNOSTIC PROCEDURE according to corresponding DTC.

>> GO TO 14.

14.CHECK "A/F ALPHA-B1"

1. Start engine.
2. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

- YES >> INSPECTION END
NO >> GO TO 15.

15.DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Stop the engine.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[HR16DE]

< COMPONENT DIAGNOSIS >

2. Disconnect ECM harness connector.
3. Check pin terminal and connector for damage, and then reconnect it.

A

>> GO TO 16.

16.CHECK "A/F ALPHA-B1"

EC

1. Start engine.
2. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

C

Is the measurement value within the SP value?

YES >> INSPECTION END

D

NO >> Detect malfunctioning part according to [EC-484. "Symptom Table"](#).

17.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

E

Is the measurement value within the SP value?

YES >> INSPECTION END

F

NO-1 >> More than the SP value: GO TO 18.

NO-2 >> Less than the SP value: GO TO 25.

18.DETECT MALFUNCTIONING PART

G

1. Check for the cause of large engine friction. Refer to the following.
 - Engine oil level is too high
 - Engine oil viscosity
 - Belt tension of power steering, alternator, A/C compressor, etc. is excessive
 - Noise from engine
 - Noise from transmission, etc.
2. Check for the cause of insufficient combustion. Refer to the following.
 - Valve clearance malfunction
 - Intake valve timing control function malfunction
 - Camshaft sprocket installation malfunction, etc.

H

I

J

>> Repair or replace malfunctioning part, and then GO TO 30.

19.CHECK INTAKE SYSTEM

K

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

L

Is the inspection result normal?

M

YES >> GO TO 21.

NO >> Repair or replace malfunctioning part, and then GO TO 20.

N

20.CHECK "A/F ALPHA-B1", AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1" and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

O

Is the measurement value within the SP value?

YES >> **INSPECTION END**

P

NO >> "B/FUEL SCHDL" is more, "A/F ALPHA-B1" is less than the SP value: GO TO 21.

21.DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect mass air flow sensor harness connector.
3. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[HR16DE]

< COMPONENT DIAGNOSIS >

22.CHECK "A/F ALPHA-B1"

1. Start engine.
2. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to [EC-142, "DTC Logic"](#). Then GO TO 29.

NO >> GO TO 23.

23.CHECK "MAS A/F SE-B1"

Select "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 24.

NO >> More than the SP value: Replace mass air flow sensor, and then GO TO 29.

24.REPLACE ECM

1. Replace ECM.
2. Perform [EC-23, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"](#).

>> GO TO 29.

25.CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

Is the inspection result normal?

YES >> GO TO 27.

NO >> Repair or replace malfunctioning part, and then GO TO 26.

26.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Less than the SP value: GO TO 27.

27.CHECK "MAS A/F SE-B1"

Select "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 28.

NO >> Less than the SP value: Replace mass air flow sensor, and then GO TO 30.

28.CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.

- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< COMPONENT DIAGNOSIS >

[HR16DE]

- Malfunctioning seal of intake air system, etc.

A

>> GO TO 30.

29.CHECK "A/F ALPHA-B1" AND "B/FUEL SCHDL"

EC

Select "A/F ALPHA-B1" and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

Is the measurement value within the SP value?

C

YES >> INSPECTION END

NO >> Detect malfunctioning part according to [EC-484. "Symptom Table"](#).

30.CHECK "B/FUEL SCHDL"

D

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and then make sure that the indication is within the SP value.

Is the measurement value within the SP value?

E

YES >> INSPECTION END

NO >> Detect malfunctioning part according to [EC-484. "Symptom Table"](#).

F

G

H

I

J

K

L

M

N

O

P

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

< COMPONENT DIAGNOSIS >

[HR16DE]

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

Description

INFOID:000000005398283

Intermittent incidents may occur. In many cases, the malfunction resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of Intermittent Incidents occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

Common Intermittent Incidents Report Situations

STEP in Work Flow	Situation
2	The CONSULT-III is used. The SELF DIAGNOSTIC RESULT screen shows time data other than 0 or [1t].
3 or 4	The symptom described by the customer does not recur.
5	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
10	The Diagnostic Procedure for PXXXX does not indicate the malfunctioning area.

Diagnosis Procedure

INFOID:000000005398284

1.INSPECTION START

Erase (1st trip) DTCs.

Refer to [EC-84, "Diagnosis Description"](#), "DTC AND FREEZE FRAME DATA", "How to Erase DTC and 1st Trip DTC".

>> GO TO 2.

2.CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.

Refer to [EC-119, "Ground Inspection"](#).

OK or NG

OK >> GO TO 3.

NG >> Repair or replace malfunctioning part.

3.SEARCH FOR ELECTRICAL INCIDENT

Perform [GI-25, "How to Perform Efficient Diagnosis for an Electrical Incident"](#), "INCIDENT SIMULATION TESTS".

OK or NG

OK >> GO TO 4.

NG >> Repair or replace malfunctioning part.

4.CHECK CONNECTOR TERMINALS

Refer to [GI-22, "How to Check Terminal"](#), "HOW TO PROBE CONNECTORS", "How to Check Enlarged Contact Spring of Terminal".

OK or NG

OK >> **INSPECTION END**

NG >> Repair or replace connector.

POWER SUPPLY AND GROUND CIRCUIT

< COMPONENT DIAGNOSIS >

[HR16DE]

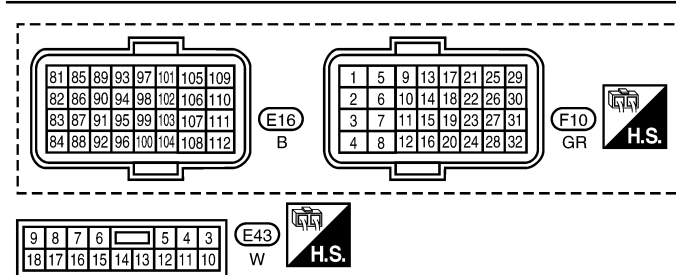
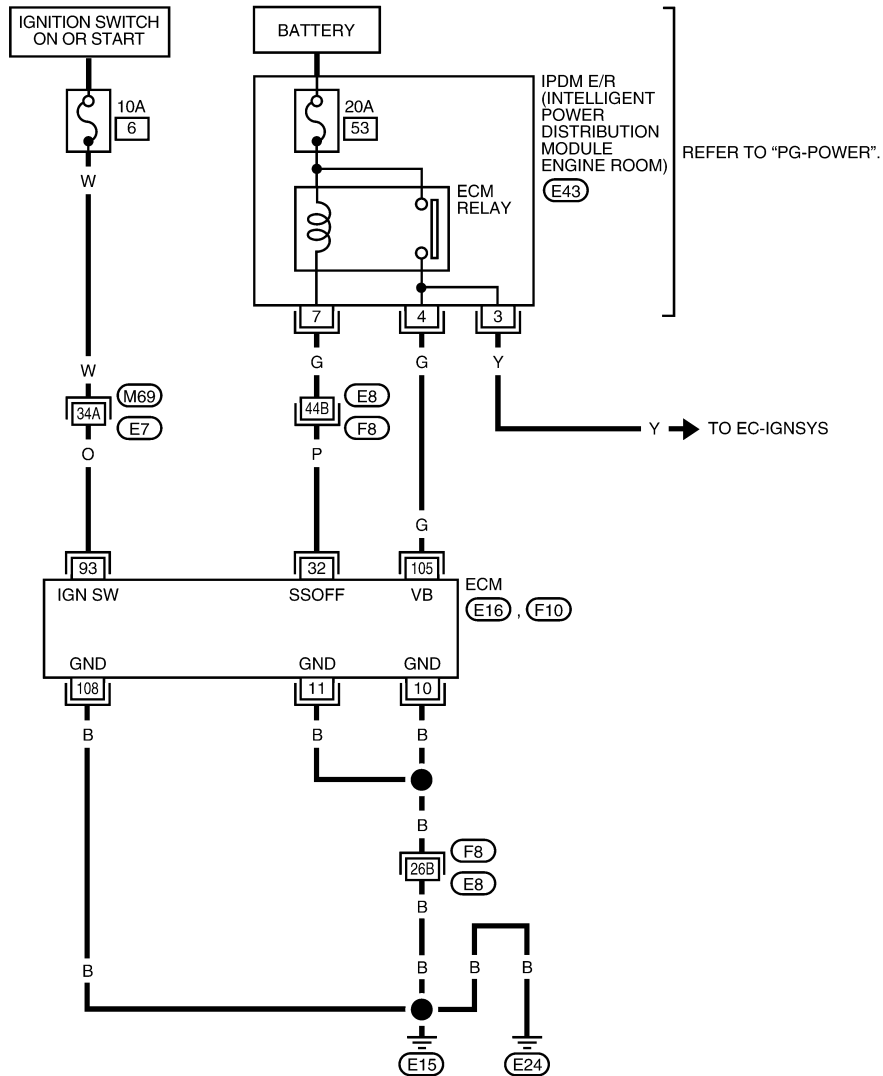
POWER SUPPLY AND GROUND CIRCUIT

Wiring Diagram

INFOID:000000005398285

EC-MAIN-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
 (M69), (F8) - SUPER
 MULTIPLE JUNCTION (SMJ)

BBWA2625E

Diagnosis Procedure

INFOID:000000005398286

1. INSPECTION START

Start engine.

POWER SUPPLY AND GROUND CIRCUIT

[HR16DE]

< COMPONENT DIAGNOSIS >

Is engine running?

- YES >> GO TO 8.
- NO >> GO TO 2.

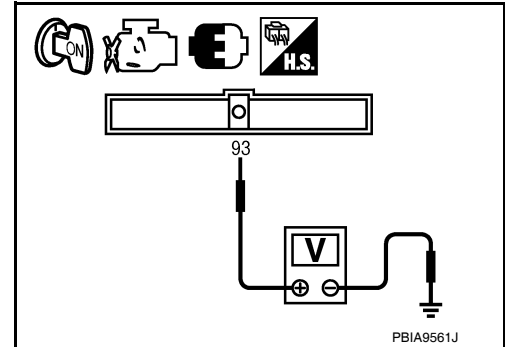
2.CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF and then ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E16	93	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M69, E7
- 10A fuse (No. 6)
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK GROUND CONNECTION-I

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair or replace ground connection.

5.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ECM harness connectors.
2. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
F10	10	Ground	Existed
	11		
E16	108		

3. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F8, E8
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

7.CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connectors.

POWER SUPPLY AND GROUND CIRCUIT

[HR16DE]

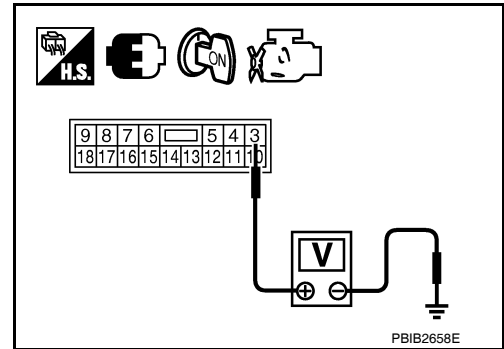
< COMPONENT DIAGNOSIS >

- Turn ignition switch ON.
- Check the voltage between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Voltage
Connector	Terminal		
E43	3	Ground	Battery voltage

Is the inspection result normal?

- YES >> Go to [EC-434, "Diagnosis Procedure"](#).
 NO >> GO TO 8.



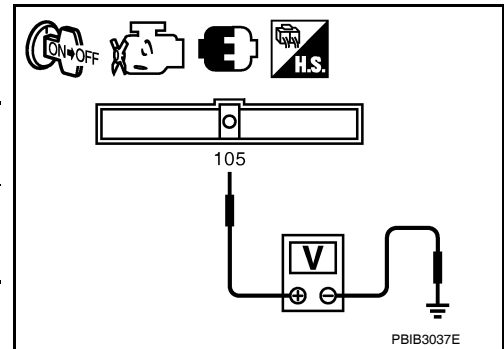
8.CHECK ECM POWER SUPPLY CIRCUIT-III

- Turn ignition switch OFF and wait at least 10 seconds.
- Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E16	105	Ground	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0 V.

Is the inspection result normal?

- YES >> GO TO 14.
 NO-1 >> Battery voltage does not exist: GO TO 9.
 NO-2 >> Battery voltage exists for more than a few seconds: GO TO 11.



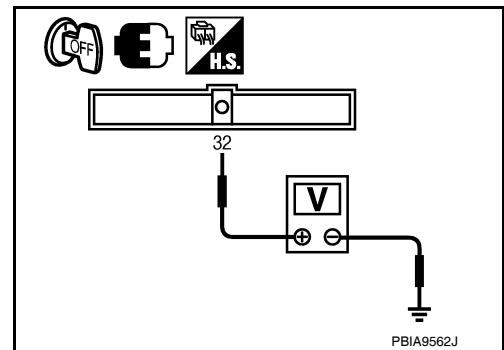
9.CHECK ECM POWER SUPPLY CIRCUIT-IV

- Turn ignition switch OFF and wait at least 10 seconds.
- Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F10	32	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 10.
 NO >> GO TO 11.



10.CHECK ECM POWER SUPPLY CIRCUIT-V

- Disconnect ECM harness connector.
- Disconnect IPDM E/R harness connector E43.
- Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E16	105	E43	4	Existed

- Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 17.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.

11.CHECK ECM POWER SUPPLY CIRCUIT-VI

- Disconnect ECM harness connector.

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

POWER SUPPLY AND GROUND CIRCUIT

[HR16DE]

< COMPONENT DIAGNOSIS >

2. Disconnect IPDM E/R harness connector E43.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F10	32	E43	7	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 13.
NO >> GO TO 12.

12.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

13.CHECK FUSE

1. Disconnect 20 A fuse (No. 53) from IPDM E/R.
2. Check 20 A fuse.

Is the inspection result normal?

- YES >> GO TO 17.
NO >> Replace 20 A fuse.

14.CHECK GROUND CONNECTION-II

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 15.
NO >> Repair or replace ground connection.

15.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
F10	10	Ground	Existed
	11		
E16	108		

3. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 17.
NO >> GO TO 16.

16.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

17.CHECK INTERMITTENT INCIDENT

Refer to [EC-114. "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Replace IPDM E/R. Refer to [PG-28. "Removal and Installation of IPDM E/R"](#).
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.

Ground Inspection

INFOID:000000005398287

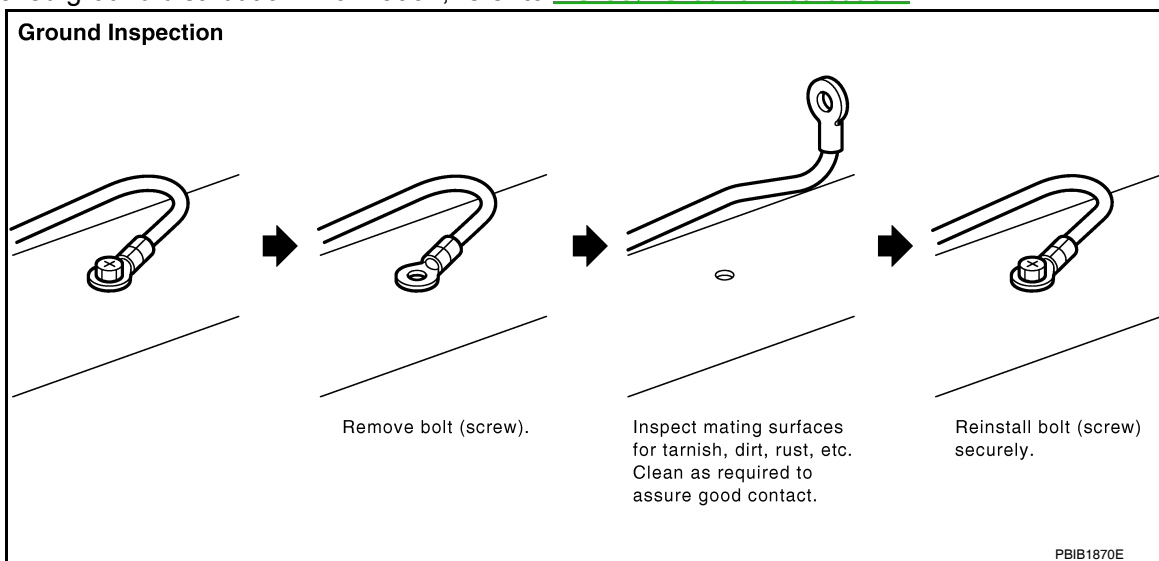
Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.

Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.

When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for "add-on" accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to [PG-30. "Ground Distribution"](#).



U0101 CAN COMM CIRCUIT

< COMPONENT DIAGNOSIS >

[HR16DE]

U0101 CAN COMM CIRCUIT

Description

INFOID:000000005398288

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:000000005398289

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0101	Lost communication with TCM	When ECM is not transmitting or receiving CAN communication signal of OBD (emission-related diagnosis) with TCM for 2 seconds or more.	<ul style="list-style-type: none">CAN communication line between TCM and ECM (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.

Is DTC detected?

- YES >> [EC-121, "Diagnosis Procedure"](#).
NO >> INSPECTION END

U0101 CAN COMM CIRCUIT




< COMPONENT DIAGNOSIS >

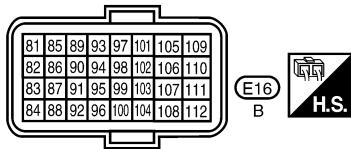
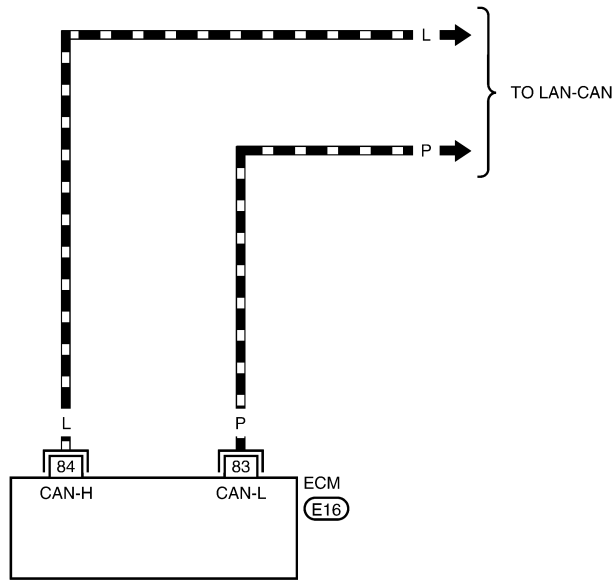
[HR16DE]

Wiring Diagram

INFOID:000000005398290

EC-CAN-01

-  : DETECTABLE LINE FOR DTC
-  : NON-DETECTABLE LINE FOR DTC
-  : DATA LINE



BBWA2626E

INFOID:000000005398291

Diagnosis Procedure

Go to [LAN-17, "Trouble Diagnosis Flow Chart"](#).

U0140 CAN COMM CIRCUIT

< COMPONENT DIAGNOSIS >

[HR16DE]

U0140 CAN COMM CIRCUIT

Description

INFOID:000000005398292

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:000000005398293

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0140	Lost communication with BCM	When ECM is not transmitting or receiving CAN communication signal of OBD (emission related diagnosis) with BCM for 2 seconds or more.	<ul style="list-style-type: none">CAN communication line between BCM and ECM (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.

Is DTC detected?

- YES >> [EC-123. "Diagnosis Procedure"](#).
NO >> INSPECTION END

U0140 CAN COMM CIRCUIT




< COMPONENT DIAGNOSIS >

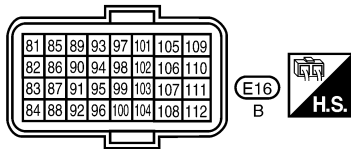
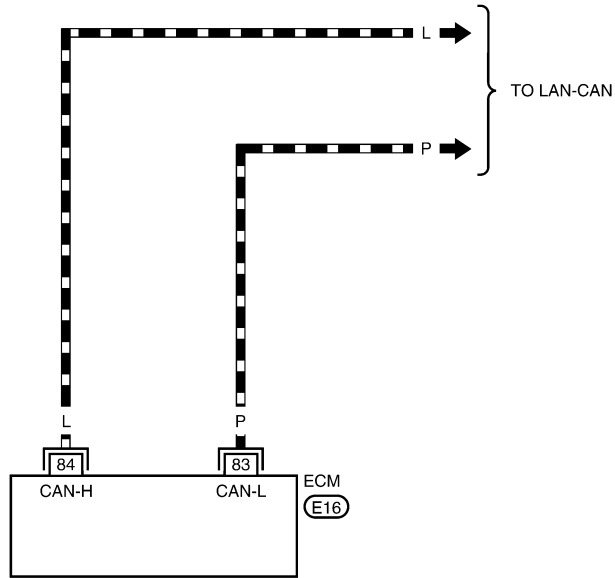
[HR16DE]

INFOID:000000005398294

Wiring Diagram

EC-CAN-01

-  : DETECTABLE LINE FOR DTC
-  : NON-DETECTABLE LINE FOR DTC
-  : DATA LINE



BBWA2626E

Diagnosis Procedure

INFOID:000000005398295

Go to [LAN-17, "Trouble Diagnosis Flow Chart"](#).

U1001 CAN COMM CIRCUIT

< COMPONENT DIAGNOSIS >

[HR16DE]

U1001 CAN COMM CIRCUIT

Description

INFOID:000000005398296

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:000000005398297

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1001	CAN communication line	When ECM is not transmitting or receiving CAN communication signal other than OBD (emission related diagnosis) for 2 seconds or more.	<ul style="list-style-type: none">Harness or connectors (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> [EC-125, "Diagnosis Procedure"](#).
NO >> INSPECTION END

U1001 CAN COMM CIRCUIT




< COMPONENT DIAGNOSIS >

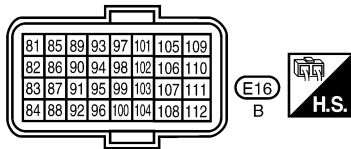
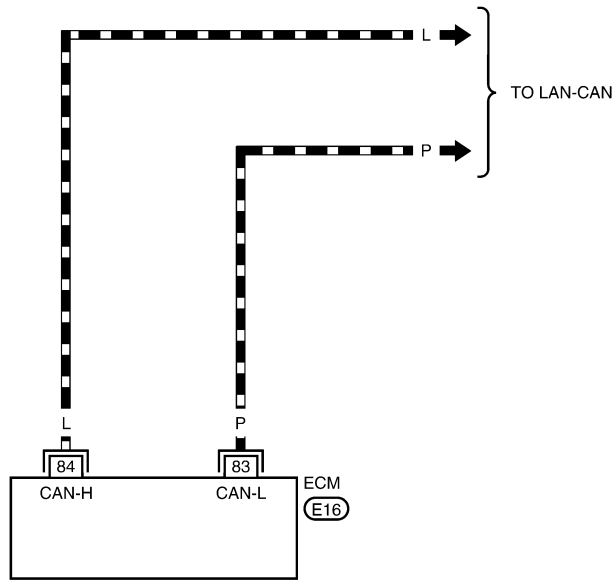
[HR16DE]

Wiring Diagram

INFOID:000000005398298

EC-CAN-01

-  : DETECTABLE LINE FOR DTC
-  : NON-DETECTABLE LINE FOR DTC
-  : DATA LINE



BBWA2626E

INFOID:000000005398299

Diagnosis Procedure

Go to [LAN-17, "Trouble Diagnosis Flow Chart"](#).

P0011 IVT CONTROL

DTC Logic

INFOID:000000005398300

DTC DETECTION LOGIC

NOTE:

If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for [EC-352, "DTC Logic"](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0011	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	<ul style="list-style-type: none"> • Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Intake valve control solenoid valve • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Foreign matter caught in the oil groove for intake valve timing control

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10 V and 16 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

 **With CONSULT-III**

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Maintain the following conditions for at least 6 consecutive seconds. Hold the accelerator pedal as steady as possible.

ENG SPEED	1,200 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 4.2 msec
Selector lever	P or N position (A/T) Neutral position (M/T)

4. Stop vehicle with engine running and let engine idle for 10 seconds.
5. Check 1st trip DTC.

 **With GST**

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

- YES >> Go to [EC-127, "Diagnosis Procedure"](#)
 NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

 **With CONSULT-III**

1. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,500 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 70°C (221°F)

< COMPONENT DIAGNOSIS >

Selector lever	1st or 2nd position
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:

Always drive at a safe speed.

2. Check 1st trip DTC.

 **With GST**

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

- YES >> Go to [EC-127, "Diagnosis Procedure"](#)
- NO >> INSPECTION END

Diagnosis Procedure

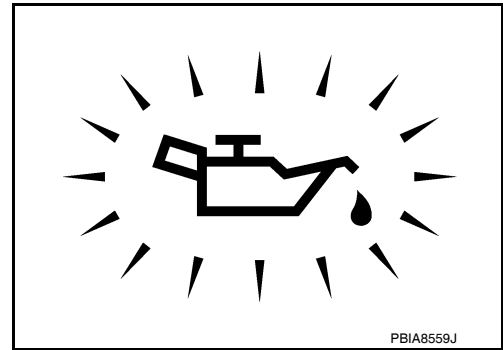
INFOID:000000005398301

1. CHECK OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check oil pressure warning lamp and confirm it is not illuminated.

Is oil pressure warning lamp illuminated?

- YES >> Go to [LU-7, "Inspection"](#).
- NO >> GO TO 2.



2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EC-128, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Replace intake valve timing control solenoid valve.

3. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to [EC-261, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Replace crankshaft position sensor (POS).

4. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-266, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Replace camshaft position sensor (PHASE).

5. CHECK CAMSHAFT (INTAKE)

Check the following.

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

P0011 IVT CONTROL

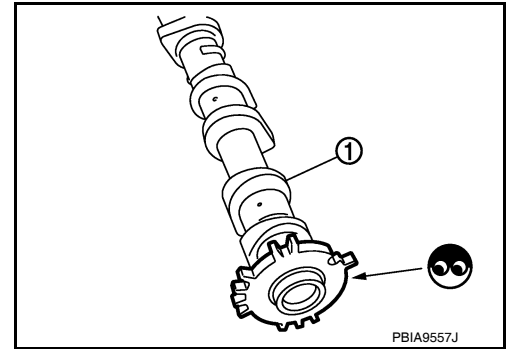
[HR16DE]

< COMPONENT DIAGNOSIS >

- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end

Is the inspection result normal?

- YES >> GO TO 6.
 NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



6. CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

- YES >> Check timing chain installation. Refer to [EM-49, "Removal and Installation"](#).
 NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to [EM-65, "Inspection"](#), "INSPECTION AFTER INSTALATION".

Is the inspection result normal?

- YES >> GO TO 8.
 NO >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398302

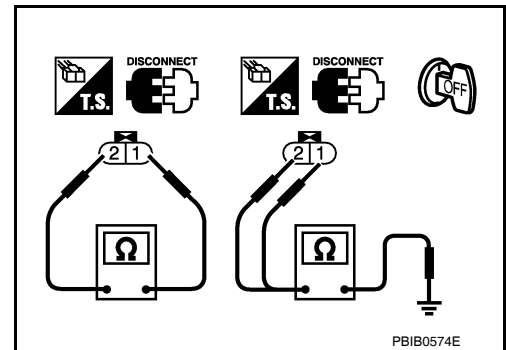
1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Check resistance between intake valve timing control solenoid valve terminals as per the following.

Terminals	Resistance
1 and 2	6.7 - 7.7 Ω [at 20°C (68°F)]
1 or 2 and ground	$\infty \Omega$ (Continuity should not exist)

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Replace intake valve timing control solenoid valve.



2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.

P0011 IVT CONTROL

[HR16DE]

< COMPONENT DIAGNOSIS >

2. Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:

Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

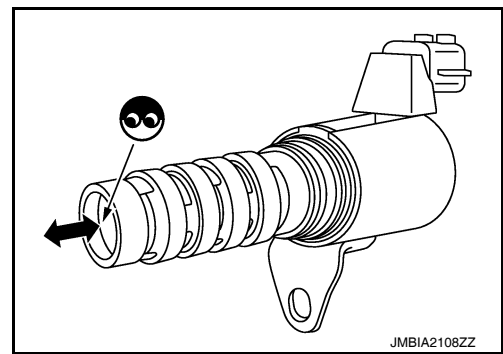
NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve.



A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

P0031, P0032 A/F SENSOR 1 HEATER

< COMPONENT DIAGNOSIS >

[HR16DE]

P0031, P0032 A/F SENSOR 1 HEATER

Description

INFOID:000000005398303

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Air fuel ratio (A/F) sensor 1 heater control	Air fuel ratio (A/F) sensor 1 heater
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF duty control of the A/F sensor 1 heater corresponding to the engine operating condition to keep the temperature of A/F sensor 1 element at the specified range.

DTC Logic

INFOID:000000005398304

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031	Air fuel ratio (A/F) sensor 1 heater control circuit low	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)	<ul style="list-style-type: none">• Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.)• A/F sensor 1 heater
P0032	Air fuel ratio (A/F) sensor 1 heater control circuit high	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)	<ul style="list-style-type: none">• Harness or connectors (The A/F sensor 1 heater circuit is shorted.)• A/F sensor 1 heater

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than between 11 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-131, "Diagnosis Procedure"](#).
NO >> INSPECTION END

P0031, P0032 A/F SENSOR 1 HEATER

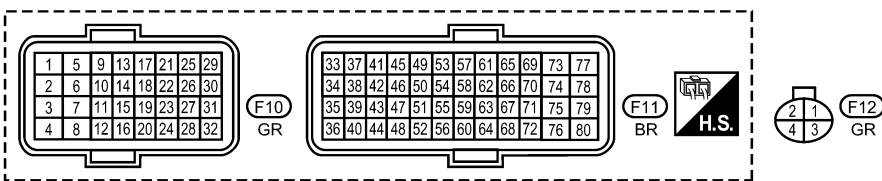
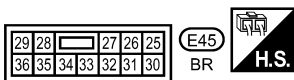
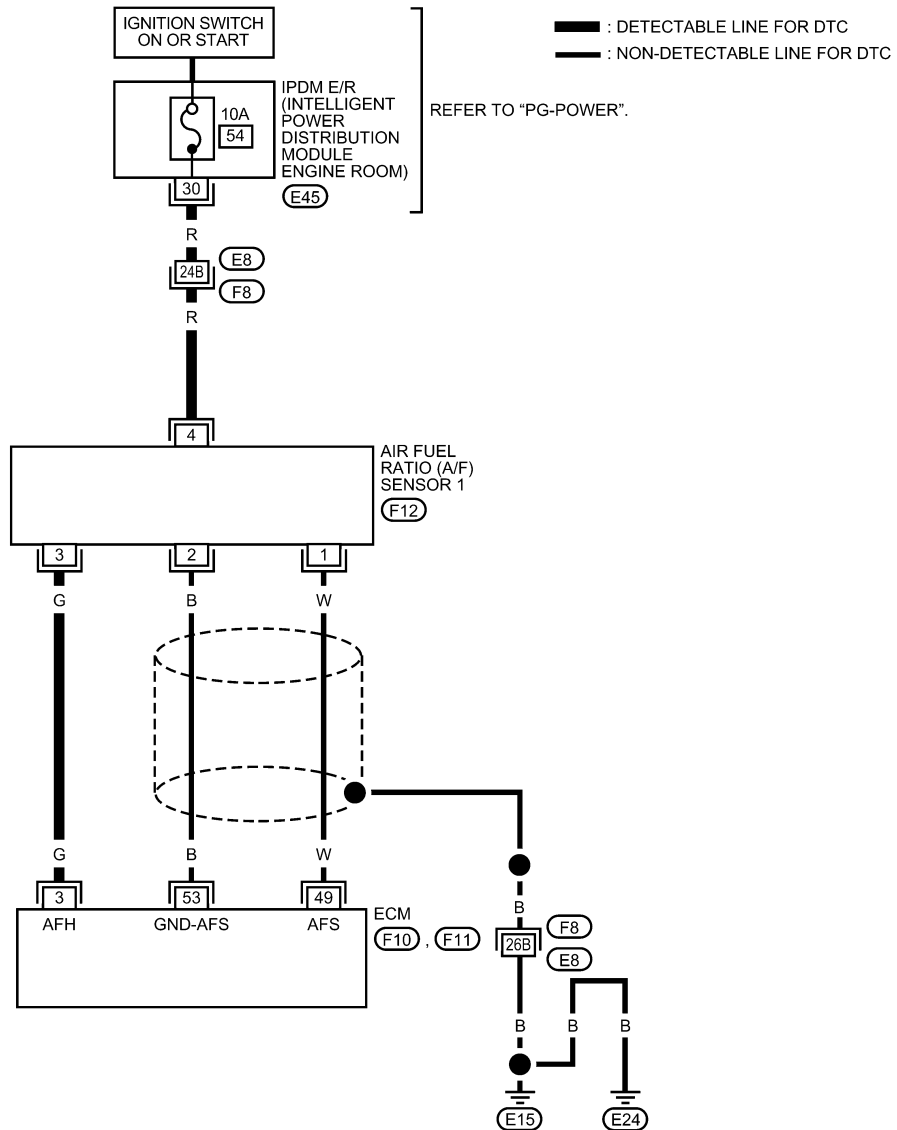
< COMPONENT DIAGNOSIS >

[HR16DE]

INFOID:000000005398305

Wiring Diagram

EC-A/FH-01



REFER TO THE FOLLOWING.
 (F8) - SUPER MULTIPLE JUNCTION (SMJ)

AABWA0308GB

Diagnosis Procedure

INFOID:000000005398306

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119. "Ground Inspection"](#).

Is the inspection result normal?

P0031, P0032 A/F SENSOR 1 HEATER

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
NO >> Repair or replace ground connection.

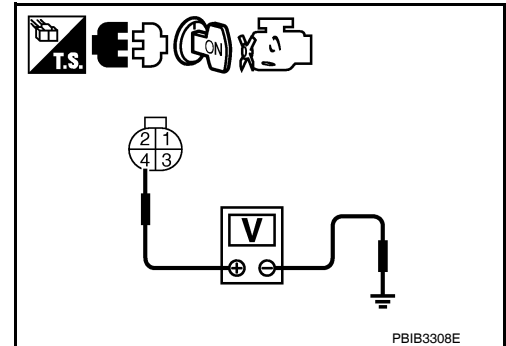
2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F12	4	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- IPDM E/R harness connector E45
- 10 A fuse (No. 54)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK A/F SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	3	F10	3	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK A/F SENSOR 1 HEATER

Refer to [EC-133, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

P0031, P0032 A/F SENSOR 1 HEATER

< COMPONENT DIAGNOSIS >

[HR16DE]

7. CHECK INTERMITTENT INCIDENT

Perform [EC-114. "Diagnosis Procedure"](#).

>> Repair or replace.

Component Inspection

INFOID:000000005398307

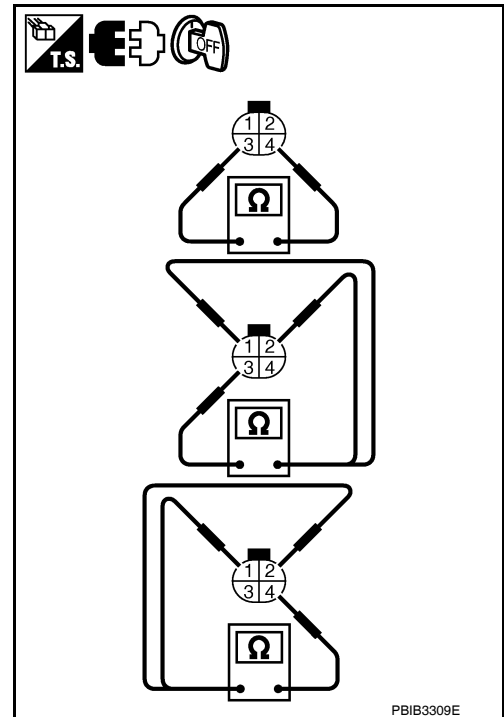
1. CHECK AIR FUEL RATIO (A/F) SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Check resistance between A/F sensor 1 terminals as per the following.

Terminals	Resistance
3 and 4	1.98 - 2.66 Ω [at 25°C (77°F)]
3 and 1, 2	$\infty \Omega$ (Continuity should not exist)
4 and 1, 2	$\infty \Omega$ (Continuity should not exist)

Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 2.



2. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

P0037, P0038 HO2S2 HEATER

< COMPONENT DIAGNOSIS >

[HR16DE]

P0037, P0038 HO2S2 HEATER

Description

INFOID:000000005398308

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Engine coolant temperature sensor	Engine coolant temperature		
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

Engine speed	Heated oxygen sensor 2 heater
Above 3,600 rpm	OFF
Below 3,600 rpm after the following conditions are met. <ul style="list-style-type: none">• Engine: After warming up• Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

DTC Logic

INFOID:000000005398309

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	<ul style="list-style-type: none">• Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.)• Heated oxygen sensor 2 heater
P0038	Heated oxygen sensor 2 heater control circuit high	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	<ul style="list-style-type: none">• Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.)• Heated oxygen sensor 2 heater

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

P0037, P0038 HO2S2 HEATER

[HR16DE]

< COMPONENT DIAGNOSIS >

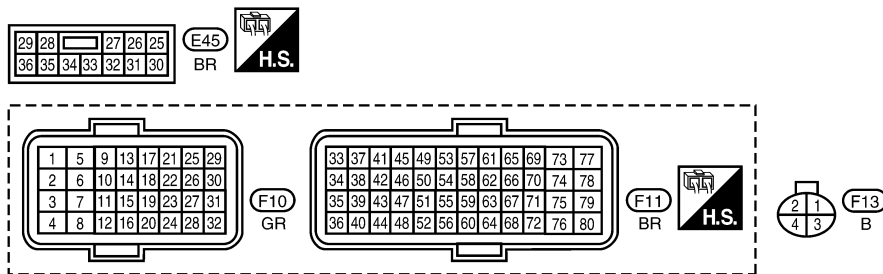
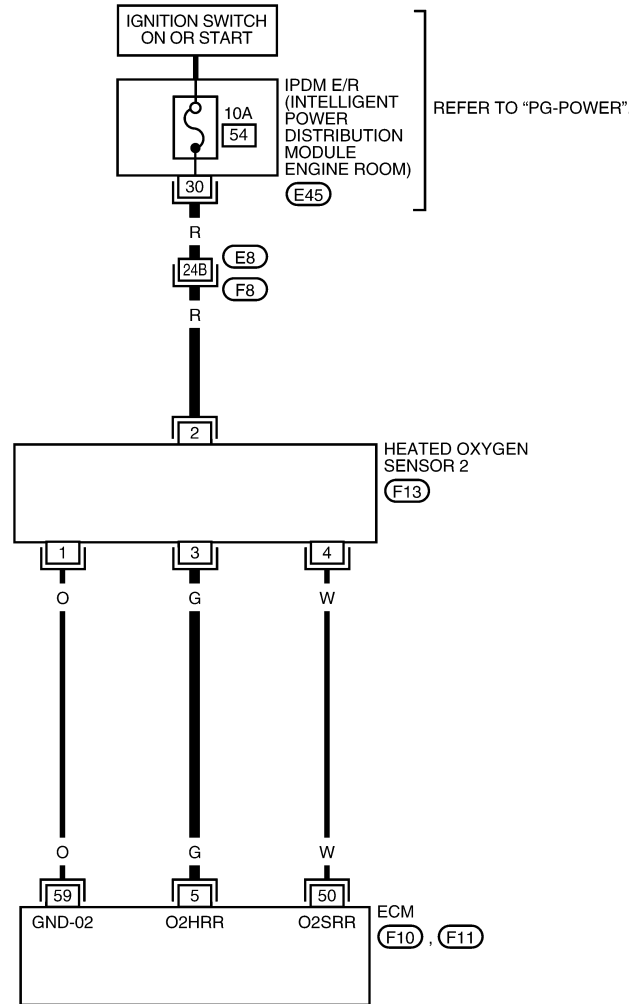
- YES >> Go to [EC-135. "Diagnosis Procedure"](#).
- NO >> INSPECTION END

Wiring Diagram

INFOID:000000005398310

EC-HO2S2H-01

- : DETECTABLE LINE FOR DTC
- : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

- SUPER MULTIPLE JUNCTION (SMJ)

BBWA2628E

Diagnosis Procedure

INFOID:000000005398311

1. CHECK GROUND CONNECTION

P0037, P0038 HO2S2 HEATER

[HR16DE]

< COMPONENT DIAGNOSIS >

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace ground connection.

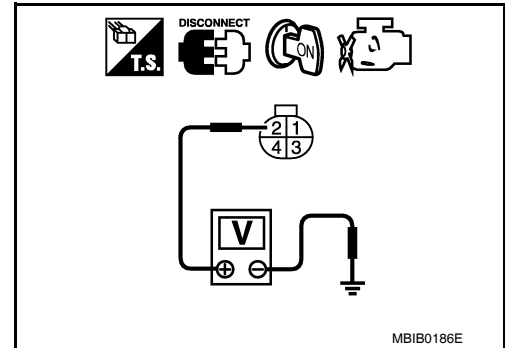
2. CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between HO2S2 harness connector and ground.

HO2S2		Ground	Voltage
Connector	Terminal		
F13	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- IPDM E/R connector E45
- 10 A fuse (No. 54)
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	3	F10	5	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to [EC-137, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 7.
NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

P0037, P0038 HO2S2 HEATER

< COMPONENT DIAGNOSIS >

[HR16DE]

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398312

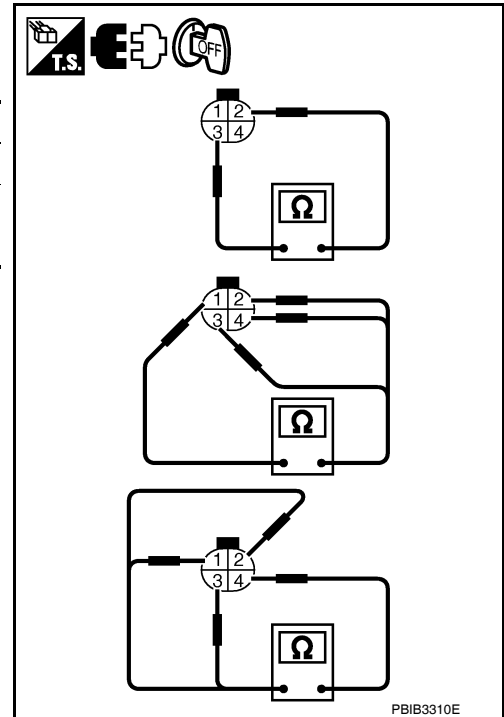
1. CHECK HEATED OXYGEN SENSOR 2 HEATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
3. Check resistance between HO2S2 terminals as per the following.

Terminals	Resistance
2 and 3	3.4 - 4.4 Ω [at 25°C (77°F)]
1 and 2, 3, 4	$\infty \Omega$ (Continuity should not exist)
4 and 1, 2, 3	

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> GO TO 2.



2. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

P0075 IVT CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

[HR16DE]

P0075 IVT CONTROL SOLENOID VALVE

Description

INFOID:000000005398313

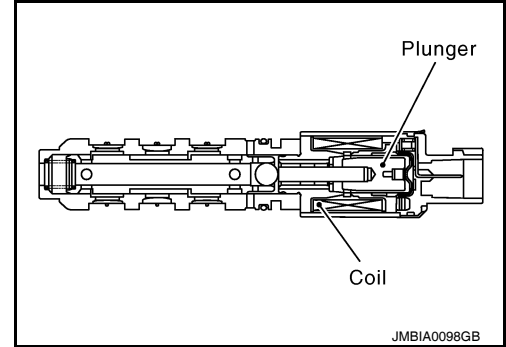
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.

The longer pulse width advances valve angle.

The shorter pulse width retards valve angle.

When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.



DTC Logic

INFOID:000000005398314

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0075	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	<ul style="list-style-type: none">• Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.)• Intake valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-139, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

P0075 IVT CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

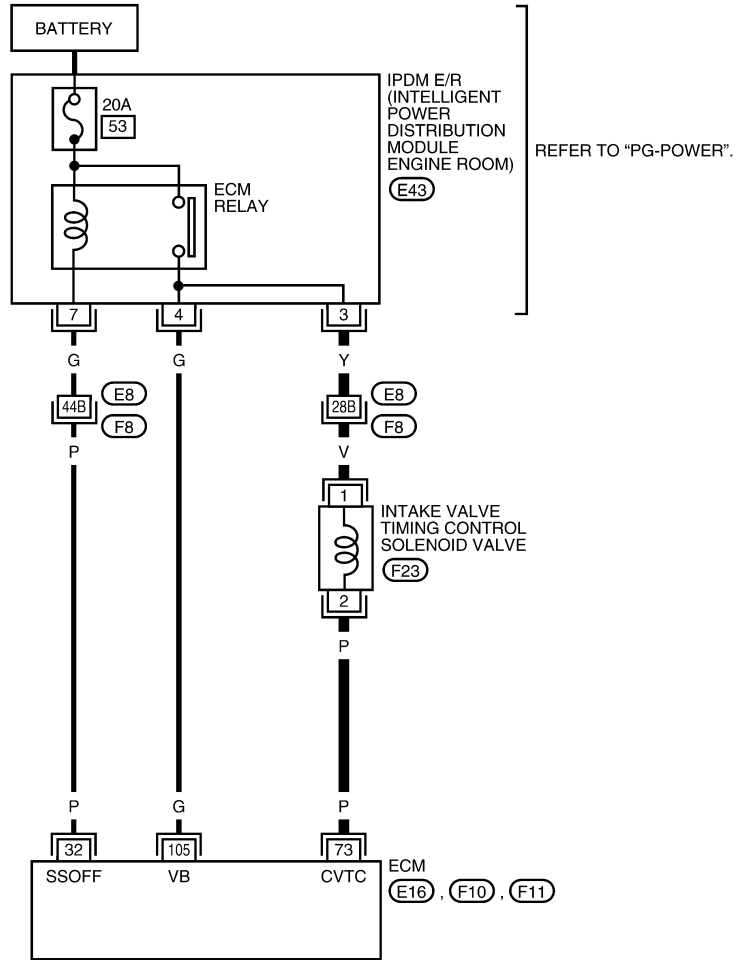
[HR16DE]

Wiring Diagram

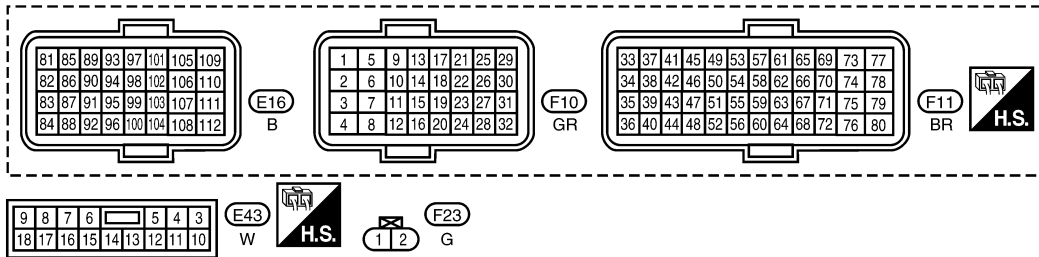
INFOID:000000005398315

EC-IVC-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
 (F8) - SUPER MULTIPLE JUNCTION (SMJ)



ABBWA0350GB

Diagnosis Procedure

INFOID:000000005398316

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect intake valve timing (IVT) control solenoid valve harness connector.
3. Turn ignition switch ON.

P0075 IVT CONTROL SOLENOID VALVE

[HR16DE]

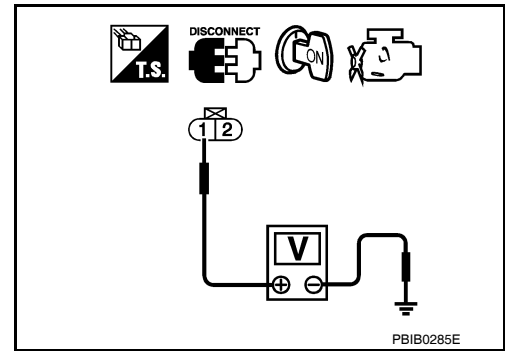
< COMPONENT DIAGNOSIS >

4. Check the voltage between intake valve timing control solenoid valve harness connector and ground.

IVT control solenoid valve		Ground	Voltage
Connector	Terminal		
F23	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- IPDM E/R connector E43
- Harness for open or short between IVT control solenoid valve and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between IVT control solenoid valve harness connector and ECM harness connector.

IVT control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F23	2	F11	73	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EC-140, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Replace intake valve timing control solenoid valve.

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398317

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.

P0075 IVT CONTROL SOLENOID VALVE

[HR16DE]

< COMPONENT DIAGNOSIS >

3. Check resistance between intake valve timing control solenoid valve terminals as per the following.

Terminals	Resistance
1 and 2	6.7 - 7.7 Ω [at 20°C (68°F)]
1 or 2 and ground	$\infty \Omega$ (Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace intake valve timing control solenoid valve.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.
2. Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:

Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

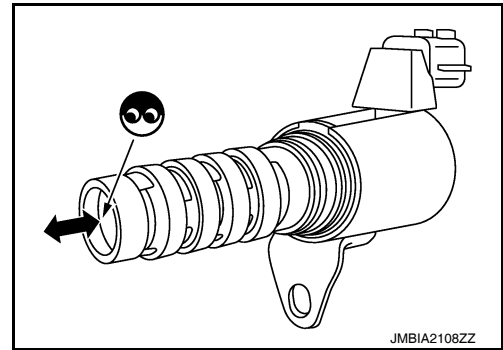
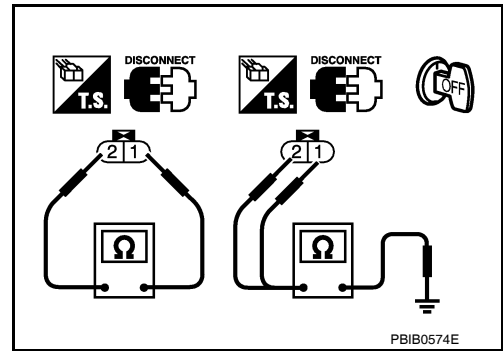
NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve.



A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

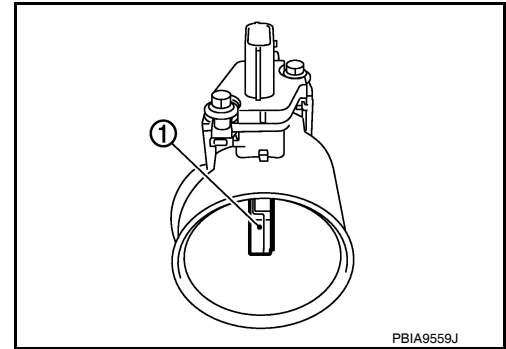
P0101 MAF SENSOR

Description

INFOID:000000005398318

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



DTC Logic

INFOID:000000005398319

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0101	Mass air flow sensor circuit range/performance	A)	A high voltage from the sensor is sent to ECM under light load driving condition.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor • EVAP control system pressure sensor
		B)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor • EVAP control system pressure sensor • Intake air temperature sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch ON) instead of running engine at idle speed.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Start engine and warm it up to normal operating temperature.
2. Run engine for at least 10 seconds at idle speed.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-145, "Diagnosis Procedure"](#).
- NO-1 >> With CONSULT-III: GO TO 3.
- NO-2 >> Without CONSULT-III: GO TO 5.

3. CHECK MASS AIR FLOW SENSOR FUNCTION

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
If engine cannot be started, go to [EC-145, "Diagnosis Procedure"](#).

P0101 MAF SENSOR

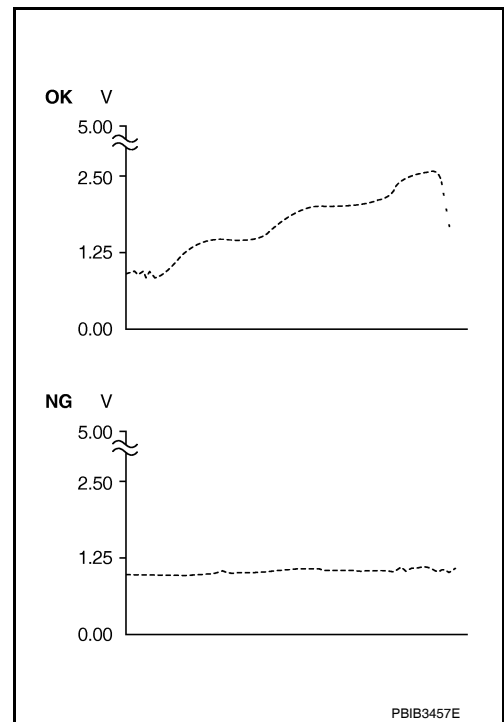
[HR16DE]

< COMPONENT DIAGNOSIS >

3. Select "DATA MONITOR" mode with CONSULT-III.
4. Check the voltage of "MAS A/F SE-B1" with "DATA MONITOR".
5. Increases engine speed to about 4,000 rpm.
6. Monitor the linear voltage rise in response to engine speed increases.

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Go to [EC-145, "Diagnosis Procedure"](#).



4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
TP SEN 1-B1	More than 1.5 V
TP SEN 2-B1	More than 1.5 V
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

CAUTION:

Always drive vehicle at a safe speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-145, "Diagnosis Procedure"](#).
 NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to [EC-143, "Component Function Check"](#).

NOTE:

Use component function check to check the overall function of the mass air flow sensor circuit. During this check, a DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Go to [EC-145, "Diagnosis Procedure"](#).

Component Function Check

INFOID:000000005398320

1. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

With GST

1. Start engine and warm it up to normal operating temperature.
2. Select Service \$01 with GST.

P0101 MAF SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

3. Check the mass air flow sensor signal with Service \$01.
4. Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Go to [EC-145. "Diagnosis Procedure"](#).

CALC LOAD	20%
COOLANT TEMP	95°C
SHORT FT #1	2%
LONG FT #1	0%
SHORT FT #2	4%
LONG FT #2	0%
ENGINE SPD	2637RPM
VEHICLE SPD	0MPH
IGN ADVANCE	41.0°
INTAKE AIR	41°C
MAF	14.1gm/sec
THROTTLE POS	3%

SEF534P

P0101 MAF SENSOR

< COMPONENT DIAGNOSIS >

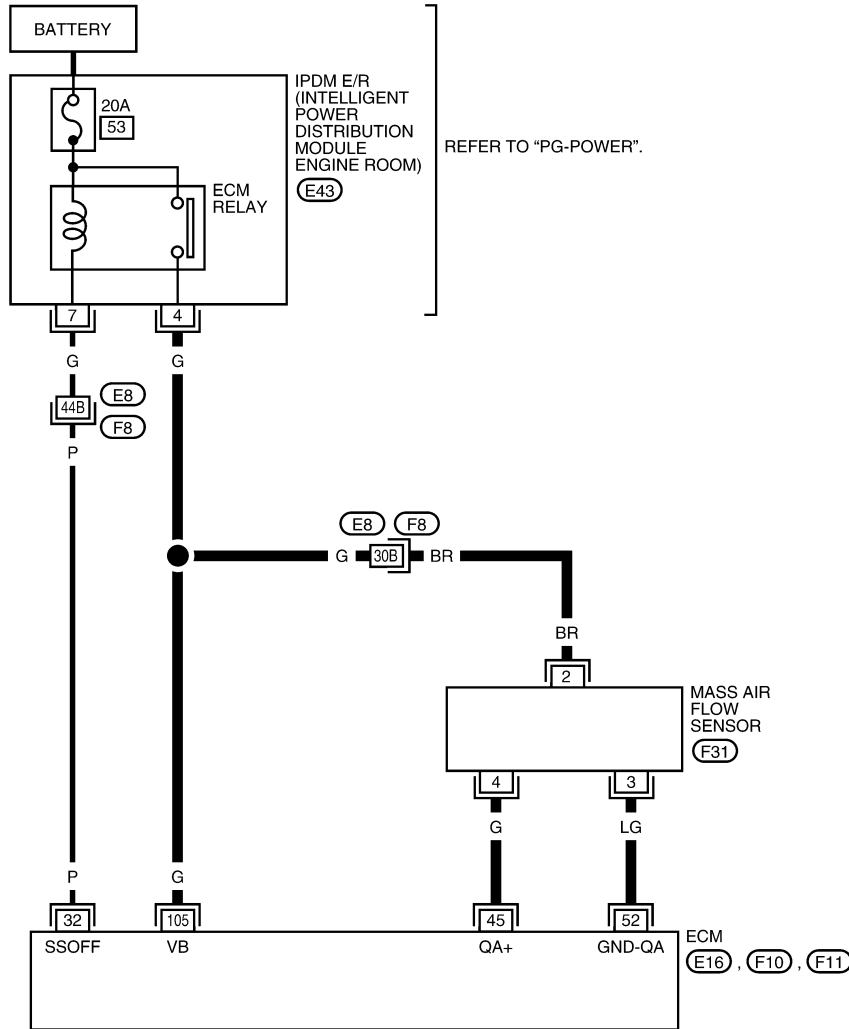
[HR16DE]

Wiring Diagram

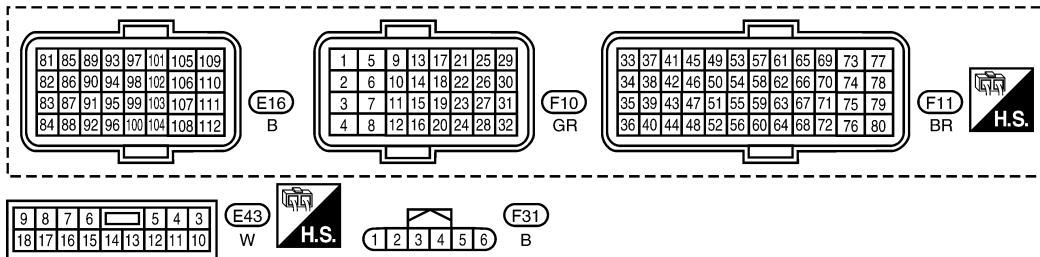
INFOID:000000005398321

EC-MAFS-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
 (F8) - SUPER MULTIPLE JUNCTION (SMJ)



BBWA2632E

Diagnosis Procedure

INFOID:000000005398322

1. INSPECTION START

Confirm the detected malfunction (A or B). Refer to [EC-142, "DTC Logic"](#).

Which malfunction is detected?

< COMPONENT DIAGNOSIS >

- A >> GO TO 3.
- B >> GO TO 2.

2.CHECK INTAKE SYSTEM

Check the following for connection.

- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Reconnect the parts.

3.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair or replace ground connection.

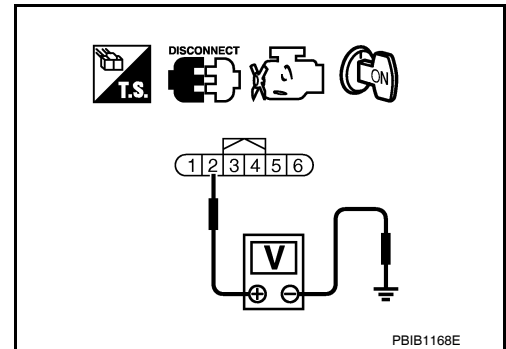
4.CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between MAF sensor harness connector and ground.

MAF sensor		Ground	Voltage
Connector	Terminal		
F31	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> GO TO 5.



5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	3	F11	52	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between MAF sensor harness connector and ECM harness connector.

P0101 MAF SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	4	F11	45	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK INTAKE AIR TEMPERATURE SENSOR

Check intake air temperature sensor.

Refer to [EC-158. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace mass air flow sensor (with intake air temperature sensor).

9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-308. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace EVAP control system pressure sensor.

10.CHECK MASS AIR FLOW SENSOR

Refer to [EC-147. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace mass air flow sensor.

11.CHECK INTERMITTENT INCIDENT

Refer to [EC-114. "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398323

1.CHECK MASS AIR FLOW SENSOR-I

With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT-III and select "DATA MONITOR" mode.
5. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
	Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

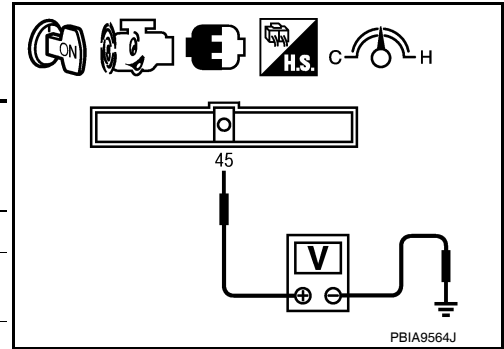
1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.

P0101 MAF SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

4. Check the voltage between ECM harness connector and ground.



ECM		Ground	Condition	Voltage
Con- nector	Termi- nal			
F11	45 (MAF sensor signal)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
			Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 2.

2. CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MASS AIR FLOW SENSOR

- Turn ignition switch OFF.
- Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
 - Crushed air ducts
 - Malfunctioning seal of air cleaner element
 - Uneven dirt of air cleaner element
 - Improper specification of intake air system parts

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK MASS AIR FLOW SENSOR-II

With CONSULT-III

- Repair or replace malfunctioning part.
- Start engine and warm it up to normal operating temperature.
- Connect CONSULT-III and select "DATA MONITOR" mode.
- Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
	Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

- Repair or replace malfunctioning part.
- Start engine and warm it up to normal operating temperature.

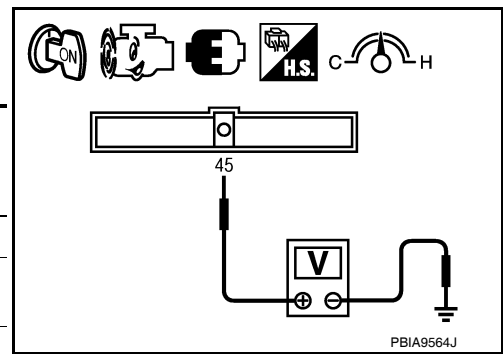
P0101 MAF SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Con- nector	Termi- nal			
F11	45 (MAF sensor signal)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
			Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*



*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 4.

4. CHECK MASS AIR FLOW SENSOR-III

With CONSULT-III

- Turn ignition switch OFF.
- Disconnect mass air flow sensor harness connector and reconnect it again.
- Start engine and warm it up to normal operating temperature.
- Connect CONSULT-III and select "DATA MONITOR" mode.
- Select "MAS A/F SE-B1" and check indication.

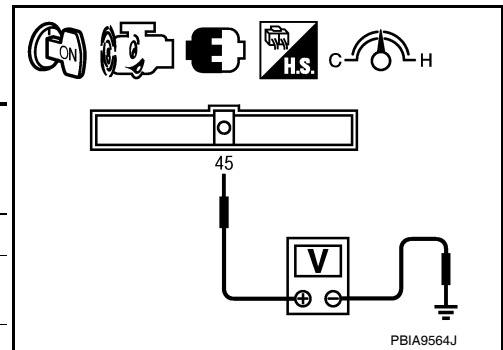
Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
	Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

- Turn ignition switch OFF.
- Disconnect mass air flow sensor harness connector and reconnect it again.
- Start engine and warm it up to normal operating temperature.
- Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Con- nector	Termi- nal			
F11	45 (MAF sensor signal)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
			Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*



*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor.

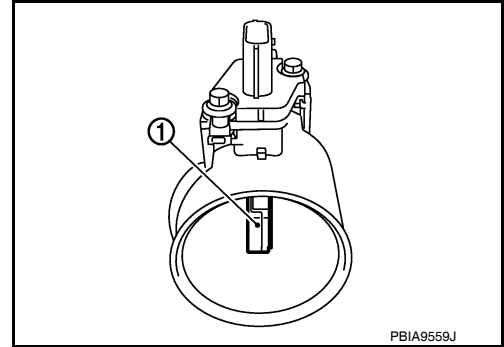
P0102, P0103 MAF SENSOR

Description

INFOID:000000005398324

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



DTC Logic

INFOID:000000005398325

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
P0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

Which DTC is detected?

- P0102 >> GO TO 2.
- P0103 >> GO TO 3.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

1. Start engine and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Go to [EC-151, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

3. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-I

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Go to [EC-151, "Diagnosis Procedure"](#).
- NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-II

1. Start engine and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Go to [EC-151, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

P0102, P0103 MAF SENSOR

< COMPONENT DIAGNOSIS >

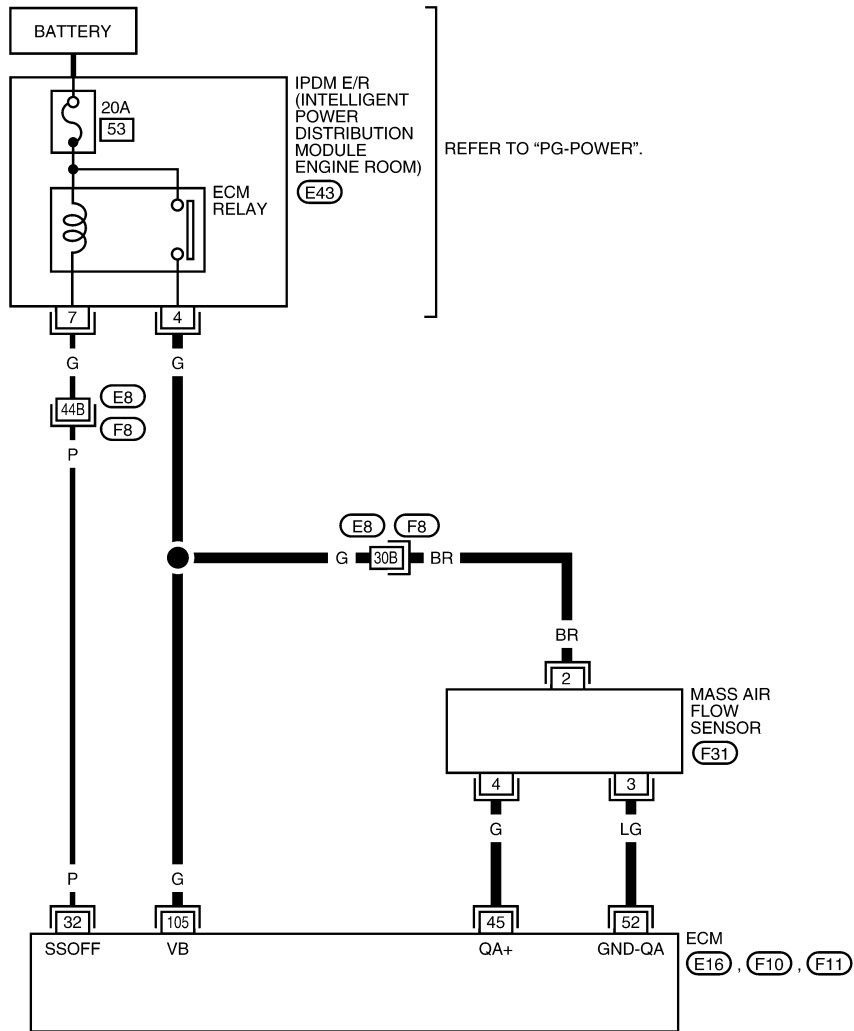
[HR16DE]

Wiring Diagram

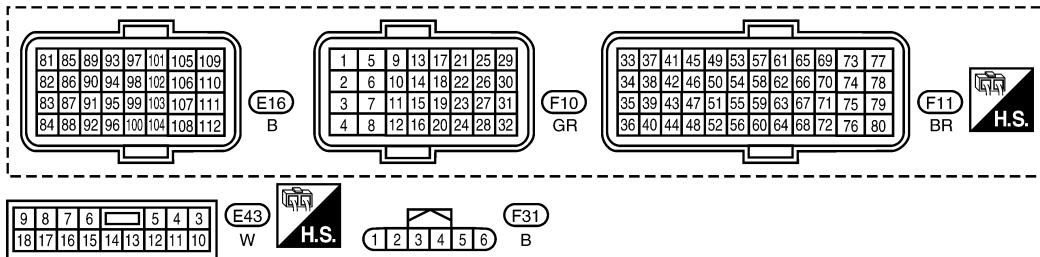
INFOID:000000005398326

EC-MAFS-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
 (F8) - SUPER MULTIPLE JUNCTION (SMJ)



BBWA2632E

Diagnosis Procedure

INFOID:000000005398327

1. INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

< COMPONENT DIAGNOSIS >

- P0102 >> GO TO 2.
- P0103 >> GO TO 3.

2. CHECK INTAKE SYSTEM

Check the following for connection.

- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Reconnect the parts.

3. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair or replace ground connection.

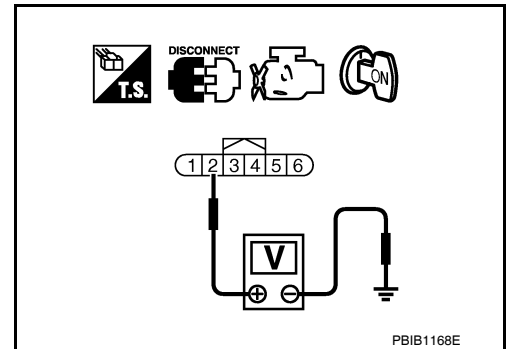
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between MAF sensor harness connector and ground.

MAF sensor		Ground	Voltage
Connector	Terminal		
F31	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	3	F11	52	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between MAF sensor harness connector and ECM harness connector.

P0102, P0103 MAF SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	4	F11	45	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR

Refer to [EC-153, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398328

1. CHECK MASS AIR FLOW SENSOR-I

With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT-III and select "DATA MONITOR" mode.
5. Select "MAS A/F SE-B1" and check indication.

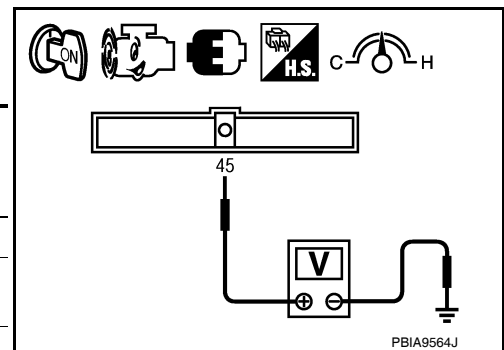
Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
	Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Con- nector	Termi- nal			
F11	45 (MAF sensor signal)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
			Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*



P0102, P0103 MAF SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MASS AIR FLOW SENSOR

1. Turn ignition switch OFF.
2. Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
 - Crushed air ducts
 - Malfunctioning seal of air cleaner element
 - Uneven dirt of air cleaner element
 - Improper specification of intake air system parts

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK MASS AIR FLOW SENSOR-II

With CONSULT-III

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-III and select "DATA MONITOR" mode.
4. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
	Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Con- nector	Termi- nal			
F11	45 (MAF sensor signal)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
			Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

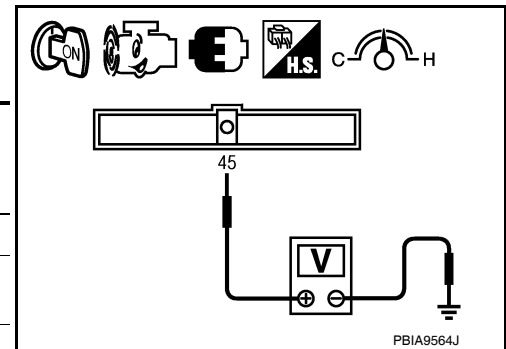
Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 4.

4.CHECK MASS AIR FLOW SENSOR-III

With CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.



P0102, P0103 MAF SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

4. Connect CONSULT-III and select "DATA MONITOR" mode.
5. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
	Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

⊗ Without CONSULT-III

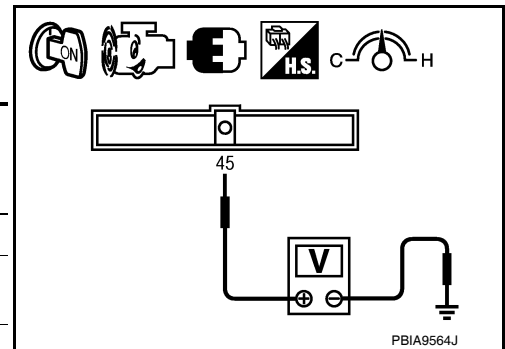
1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Con- nector	Termi- nal			
F11	45 (MAF sensor signal)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
			Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Clean or replace mass air flow sensor.



P0112, P0113 IAT SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

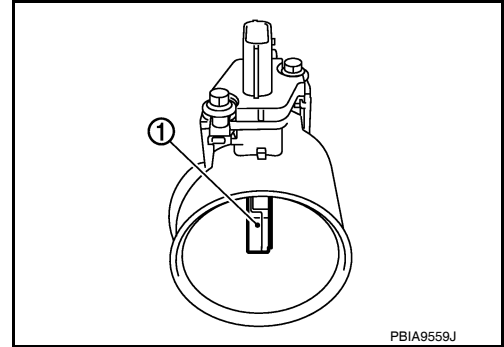
P0112, P0113 IAT SENSOR

Description

INFOID:000000005398329

The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



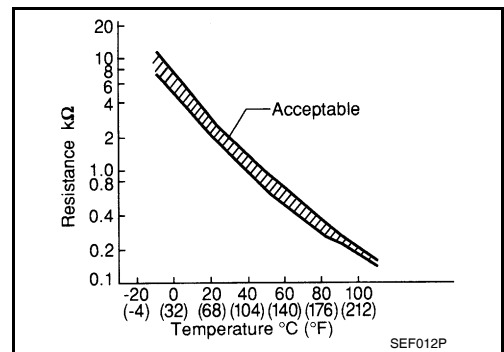
<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

*: These data are reference values and are measured between ECM terminal 46 (Intake air temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



DTC Logic

INFOID:000000005398330

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted.) • Intake air temperature sensor
P0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-157, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

P0112, P0113 IAT SENSOR



< COMPONENT DIAGNOSIS >

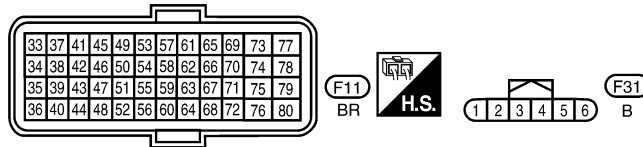
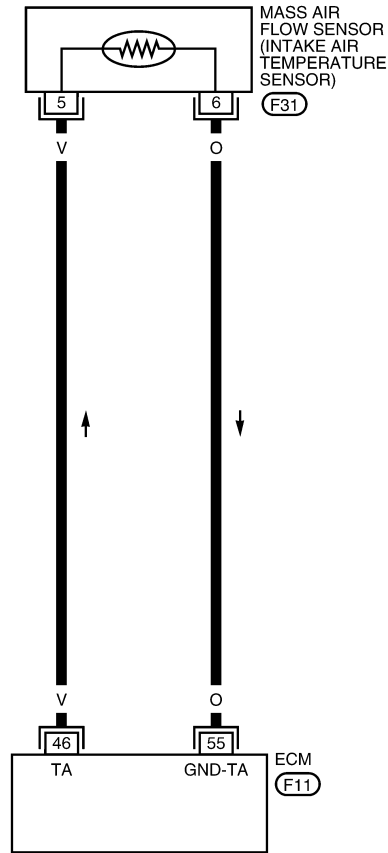
[HR16DE]

Wiring Diagram

INFOID:000000005398331

EC-IATS-01

 : DETECTABLE LINE FOR DTC
 : NON-DETECTABLE LINE FOR DTC



BBWA2633E

Diagnosis Procedure

INFOID:000000005398332

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119. "Ground Inspection"](#).

Is the inspection result normal?

P0112, P0113 IAT SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
 NO >> Repair or replace ground connection.

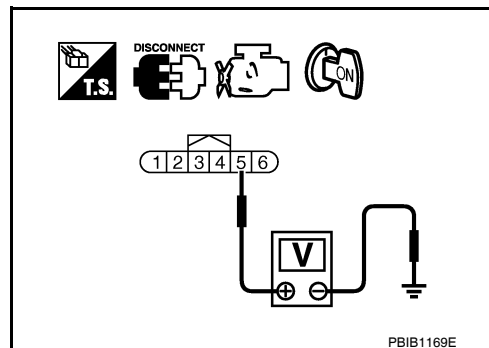
2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (with intake air temperature sensor) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between mass air flow sensor harness connector and ground.

MAF sensor		Ground	Voltage
Connector	Terminal		
F31	5	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	6	F11	55	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to [EC-158, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Replace mass air flow sensor (with intake air temperature sensor).

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398333

1. CHECK INTAKE AIR TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector.
3. Check resistance between mass air flow sensor terminals as per the following.

Terminals	Condition		Resistance (kΩ)
1 and 2	Intake air temperature [°C (°F)]	25 (77)	1.800 - 2.200

Is the inspection result normal?

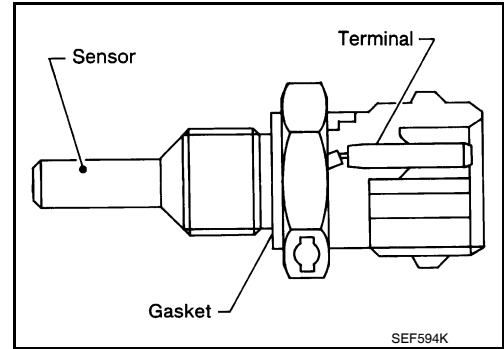
- YES >> INSPECTION END
 NO >> Replace mass air flow sensor (with intake air temperature sensor).

P0116 ECT SENSOR

Description

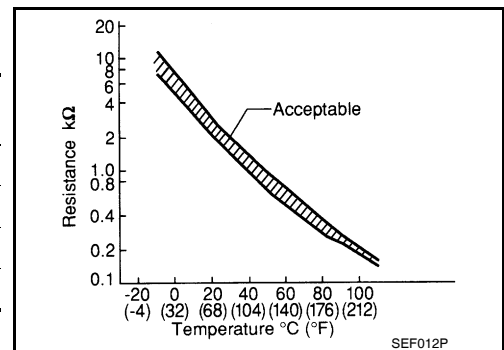
INFOID:000000005398334

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260



*: These data are reference values and are measured between ECM terminal 38 (Engine coolant temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC Logic

INFOID:000000005398335

DTC DETECTION LOGIC

NOTE:

If DTC P0116 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117, P0118. Refer to [EC-161, "DTC Logic"](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0116	Engine coolant temperature sensor circuit range/performance	Engine coolant temperature signal from engine coolant temperature sensor does not fluctuate, even when some time has passed after starting the engine with pre-warming up condition.	<ul style="list-style-type: none"> • Harness or connectors (High or low resistance in the circuit) • Engine coolant temperature sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC confirmation procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Rev engine up to 2,000 rpm for more than 10 minutes.
3. Move the vehicle to a cool place, then stop engine and turn ignition switch OFF.
4. Check resistance between "fuel level sensor unit and fuel pump" terminals 4 and 5.

P0116 ECT SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

- Soak the vehicle until the resistance between “fuel level sensor unit and fuel pump” terminals 4 and 5 becomes 0.5 kΩ higher than the value measured before soaking.

CAUTION:

Never turn ignition switch ON during the soaking time.

NOTE:

Soak time changes depending on ambient air temperature. It may take several hours.

- Start engine and let it idle for 20 minutes.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> [EC-160, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398336

1.CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connections E15, 24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-160, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Replace engine coolant temperature sensor.

3.CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398337

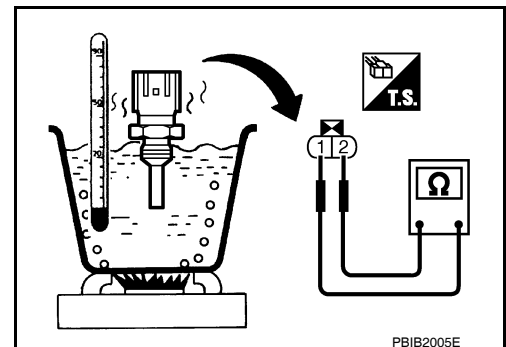
1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

- Turn ignition switch OFF.
- Disconnect engine coolant temperature sensor harness connector.
- Remove engine coolant temperature sensor.
- Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance	
1 and 2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63 kΩ
		50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace engine coolant temperature sensor.



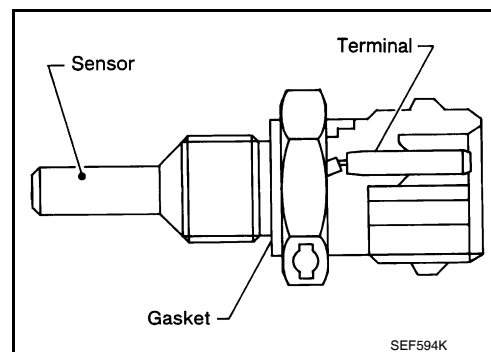
PBIB2005E

P0117, P0118 ECT SENSOR

Description

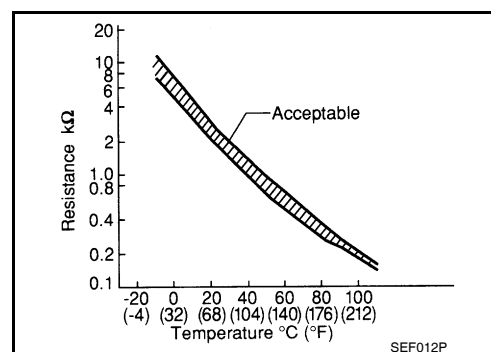
INFOID:000000005398338

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260



*: These data are reference values and are measured between ECM terminal 38 (Engine coolant temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC Logic

INFOID:000000005398339

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor
P0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Go to [EC-162. "Diagnosis Procedure"](#).
- NO >> INSPECTION END

P0117, P0118 ECT SENSOR

[HR16DE]

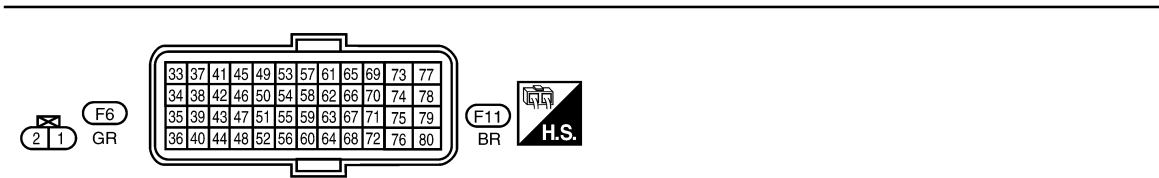
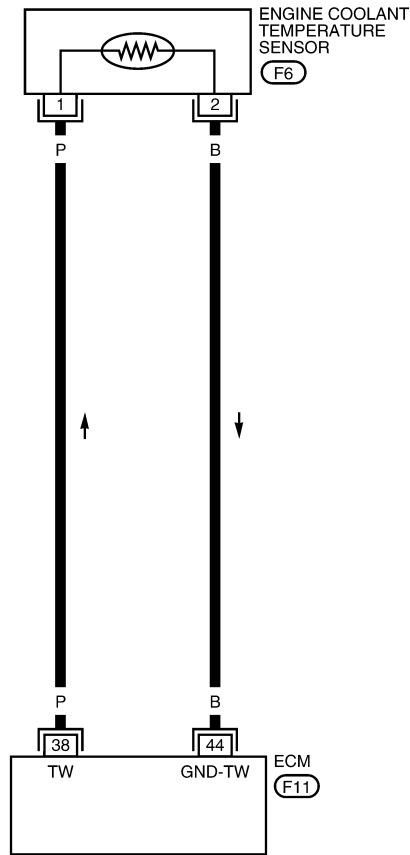
< COMPONENT DIAGNOSIS >

Wiring Diagram

INFOID:000000005398340

EC-ECTS-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



BBWA2634E

Diagnosis Procedure

INFOID:000000005398341

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

P0117, P0118 ECT SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

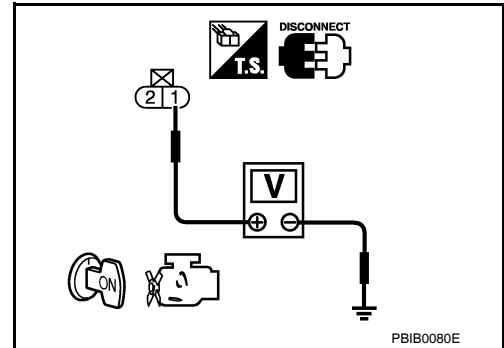
2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between ECT sensor harness connector and ground.

ECT sensor		Ground	Voltage
Connector	Terminal		
F6	1	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.



3.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECT sensor harness connector and ECM harness connector.

ECT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F6	2	F11	44	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-163, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Replace engine coolant temperature sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398342

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Remove engine coolant temperature sensor.

P0117, P0118 ECT SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

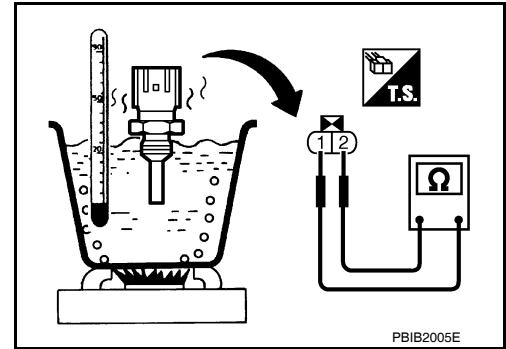
4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance	
1 and 2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63 kΩ
		50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor.



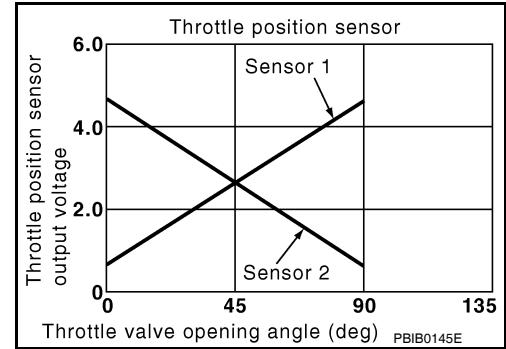
P0122, P0123 TP SENSOR

Description

INFOID:000000005398343

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic

INFOID:000000005398344

DTC DETECTION LOGIC

NOTE:

If DTC P0122 or P0123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-352, "DTC Logic"](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (TP sensor 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 2)
P0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Go to [EC-166, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

P0122, P0123 TP SENSOR

< COMPONENT DIAGNOSIS >

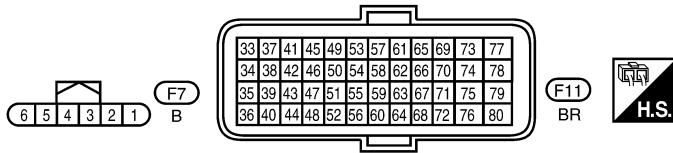
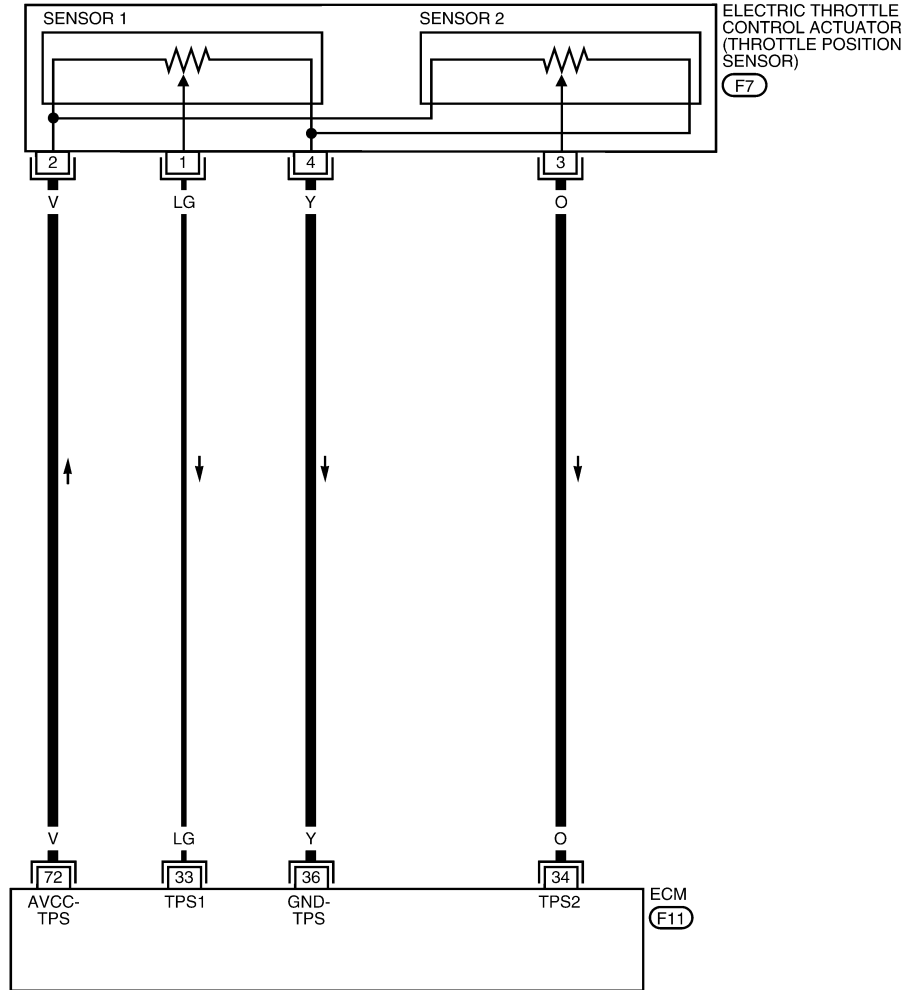
[HR16DE]

Wiring Diagram

INFOID:000000005398345

EC-TPS2-01

: DETECTABLE LINE FOR DTC
 : NON-DETECTABLE LINE FOR DTC



BBWA2656E

Diagnosis Procedure

INFOID:000000005398346

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

P0122, P0123 TP SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
 NO >> Repair or replace ground connection.

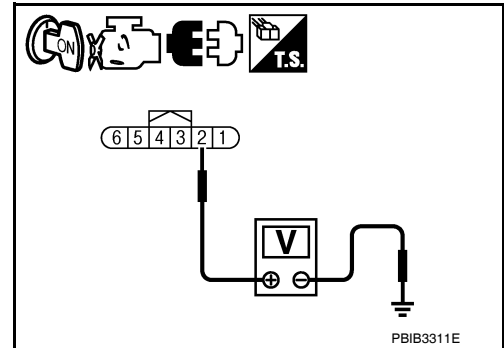
2. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.
3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F7	2	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	4	F11	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	3	F11	34	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to [EC-168, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform [EC-168, "Special Repair Requirement"](#).

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-114. "Diagnosis Procedure"](#).

>> INSPECTION END

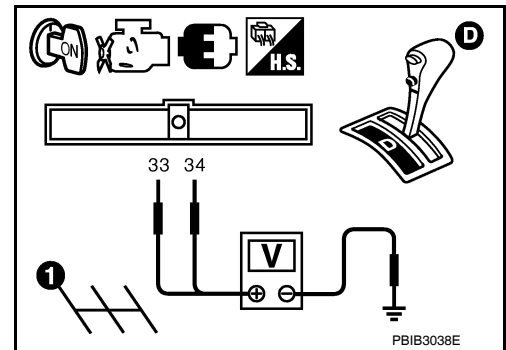
Component Inspection

INFOID:000000005398347

1. CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform [EC-25. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).
4. Turn ignition switch ON.
5. Set selector lever to D (A/T) or 1st (M/T) position.
6. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	33 (TP sensor 1 signal)	Ground	Fully released	More than 0.36V
			Fully depressed	Less than 4.75V
	34 (TP sensor 2 signal)		Fully released	Less than 4.75V
			Fully depressed	More than 0.36V



Is the inspection result normal?

- YES >> INSPECTION END
 NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform [EC-168. "Special Repair Requirement"](#).

>> INSPECTION END

Special Repair Requirement

INFOID:000000005398348

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to [EC-25. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#)

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-26. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"](#)

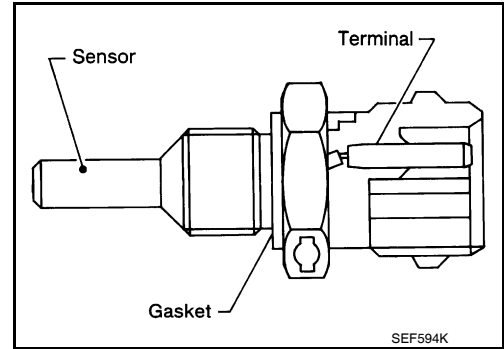
>> END

P0125 ECT SENSOR

Description

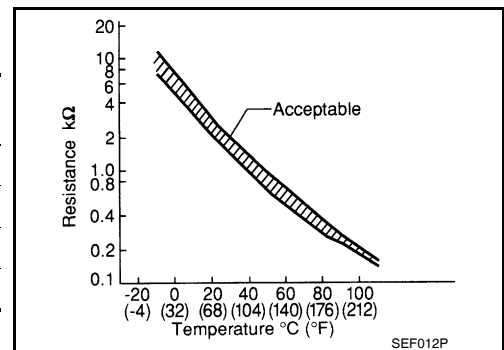
INFOID:000000005398349

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260



*: These data are reference values and are measured between ECM terminal 38 (Engine coolant temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC Logic

INFOID:000000005398350

DTC DETECTION LOGIC

NOTE:

- If DTC P0125 is displayed with P0116, first perform the trouble diagnosis for DTC P0116. Refer to [EC-159, "DTC Logic"](#).
- If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to [EC-161, "DTC Logic"](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0125	Insufficient engine coolant temperature for closed loop fuel control	<ul style="list-style-type: none"> • Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. • Engine coolant temperature is insufficient for closed loop fuel control. 	<ul style="list-style-type: none"> • Harness or connectors (High resistance in the circuit) • Engine coolant temperature sensor • Thermostat

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. CHECK ENGINE COOLANT TEMPERATURE SENSOR FUNCTION

With CONSULT-III

1. Turn ignition switch ON.

P0125 ECT SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

2. Select "DATA MONITOR" mode with CONSULT-III.
3. Check that "COOLAN TEMP/S" is above 10°C (50°F).

With GST

Follow the procedure "With CONSULT-III" above.

Is it above 10°C (50°F)?

- YES >> INSPECTION END
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Start engine and run it for 65 minutes at idle speed.
2. Check 1st trip DTC.

If "COOLAN TEMP/S" indication increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.

CAUTION:

Be careful not to overheat engine.

With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

- YES >> [EC-170. "Diagnosis Procedure"](#)
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398351

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119. "Ground Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-170. "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Replace engine coolant temperature sensor.

3.CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace thermostat. Refer to [CO-23. "Removal and Installation"](#).

4.CHECK INTERMITTENT INCIDENT

Refer to [EC-114. "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398352

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Remove engine coolant temperature sensor.

P0125 ECT SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

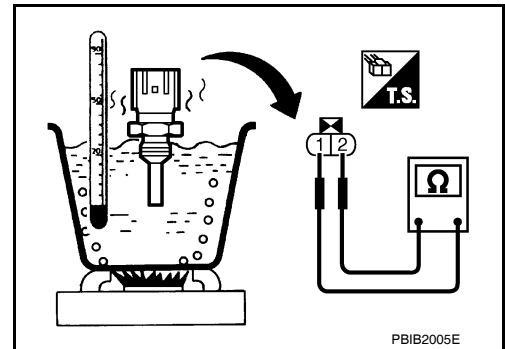
4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance	
1 and 2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63 kΩ
		50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor.



A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

P0127 IAT SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

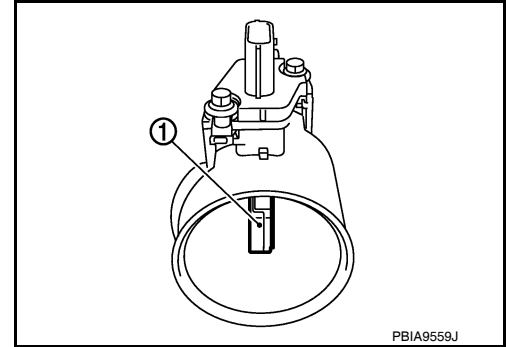
P0127 IAT SENSOR

Description

INFOID:000000005398353

The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



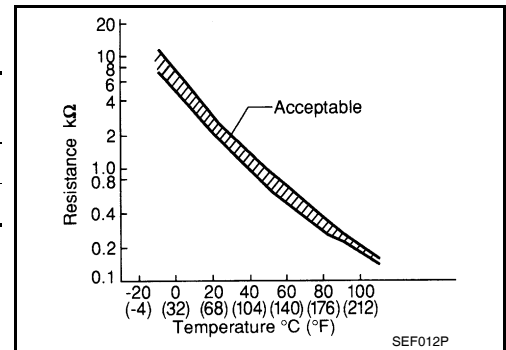
<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

*: These data are reference values and are measured between ECM terminal 46 (Intake air temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



DTC Logic

INFOID:000000005398354

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0127	Intake air temperature too high	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	<ul style="list-style-type: none">• Harness or connectors (The sensor circuit is open or shorted)• Intake air temperature sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT-III

1. Wait until engine coolant temperature is less than 96°C (205°F)
 - Turn ignition switch ON.
 - Select "DATA MONITOR" mode with CONSULT-III.
 - Check the engine coolant temperature.
 - If the engine coolant temperature is not less than 96°C (205°F), turn ignition switch OFF and cool down engine.

P0127 IAT SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

NOTE:

- Perform the following steps before engine coolant temperature is above 96°C (205°F).
- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-III.
- Start engine.
- Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.

CAUTION:

Always drive vehicle at a safe speed.

- Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

- YES >> Go to [EC-173, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398355

1.CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to [EC-173, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Replace mass air flow sensor (with intake air temperature sensor).

3.CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398356

1.CHECK INTAKE AIR TEMPERATURE SENSOR

- Turn ignition switch OFF.
- Disconnect mass air flow sensor harness connector.
- Check resistance between mass air flow sensor terminals as per the following.

Terminals	Condition	Resistance (kΩ)
1 and 2	Intake air temperature [°C (°F)]	25 (77) 1.800 - 2.200

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace mass air flow sensor (with intake air temperature sensor).

P0128 THERMOSTAT FUNCTION

< COMPONENT DIAGNOSIS >

[HR16DE]

P0128 THERMOSTAT FUNCTION

DTC Logic

INFOID:000000005398357

DTC DETECTION LOGIC

NOTE:

If DTC P0128 is displayed with DTC P0300, P0301, P0302, P0303 or P0304, first perform the trouble diagnosis for DTC P0300, P0301, P0302, P0303, P0304. Refer to [EC-247, "DTC Logic"](#).

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough.

This is due to a leak in the seal or the thermostat stuck open.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	<ul style="list-style-type: none">• Thermostat• Leakage from sealing portion of thermostat• Engine coolant temperature sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- For best results, perform at ambient temperature of -10°C (14°F) or higher.
- For best results, perform at engine coolant temperature of -10°C (14°F) to 56°C (133°F).
- Before performing the following procedure, do not fill with the fuel.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn A/C switch OFF.
2. Turn blower fan switch OFF.
3. Turn ignition switch ON.
4. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III.
5. Check the indication of "COOLAN TEMP/S"
If it is below 56°C (133°F), go to following step.
If it is above 56°C (133°F), cool down the engine to less than 56°C (133°F). Then go to next steps.
6. Start engine.
7. Drive vehicle for 10 consecutive minutes under the following conditions.

VHCL SPEED SE	More than 56km/h (35MPH)
---------------	--------------------------

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "COOLAN TEMP/S" indication increases to more than 75°C (167°F) within 10 minutes, turn ignition switch OFF because the test result will be OK.

8. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

- YES >> Go to [EC-174, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398358

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-175, "Component Inspection"](#).

P0128 THERMOSTAT FUNCTION

[HR16DE]

< COMPONENT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace engine coolant temperature sensor.

2. CHECK THERMOSTAT

Refer to [CO-24, "Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace thermostat.

Component Inspection

INFOID:000000005398359

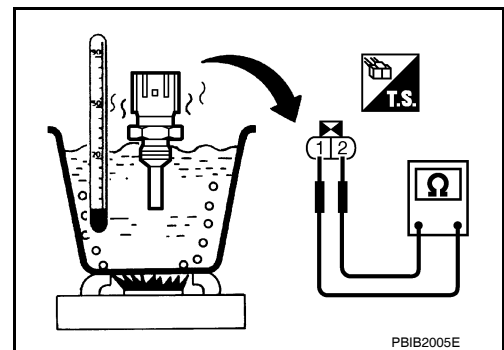
1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Remove engine coolant temperature sensor.
4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance	
1 and 2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63 kΩ
		50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace engine coolant temperature sensor.

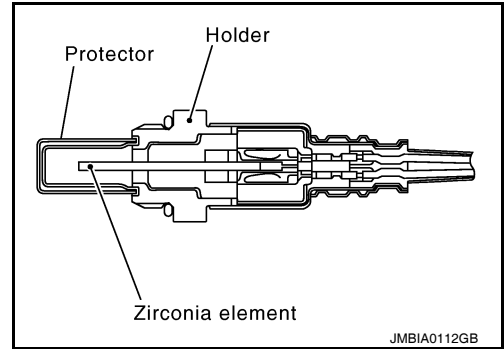


P0130 A/F SENSOR 1

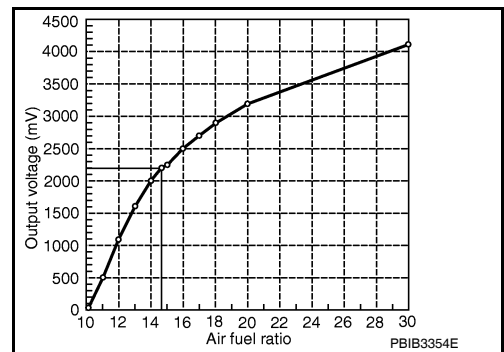
Description

INFOID:000000005398360

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element. The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range. The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



DTC Logic

INFOID:000000005398361

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible Cause
P0130	Air fuel ratio (A/F) sensor 1 circuit	A)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in the range other than approx. 2.2 V.	<ul style="list-style-type: none"> • Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • A/F sensor 1
		B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Let it idle for 2 minutes.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to [EC-179, "Diagnosis Procedure"](#).

< COMPONENT DIAGNOSIS >

- NO-1 >> With CONSULT-III: GO TO 3.
- NO-2 >> Without CONSULT-III: GO TO 7.

3. CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

1. Select "A/F SEN1 (B1)" in "DATA MONITOR" mode with CONSULT-III.
2. Check "A/F SEN1 (B1)" indication.

Does the indication fluctuates around 2.2 V?

- YES >> GO TO 4.
- NO >> Go to [EC-179. "Diagnosis Procedure"](#).

4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-I

1. Select "A/F SEN1 (B1) P1276" of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III.
2. Touch "START".
3. When the following conditions are met, "TESTING" will be displayed on the CONSULT-III screen.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 64 km/h (40 mph)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	D position (A/T) 5th position (M/T)

If "TESTING" is not displayed after 20 seconds, retry from step 2.

CAUTION:

Always drive vehicle at a safe speed.

Is "TESTING" displayed on CONSULT-III screen?

- YES >> GO TO 5.
- NO >> Check A/F sensor 1 function again. GO TO 3.

5. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-II

Release accelerator pedal fully.

NOTE:

Never apply brake during releasing the accelerator pedal.

Which does "TESTING" change to?

- COMPLETED>>GO TO 6.
- OUT OF CONDITION>>Retry DTC CONFIRMATION PROCEDURE. GO TO 4.

6. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-III

Touch "SELF-DIAG RESULT"

Which is displayed on CONSULT-III screen?

- YES >> INSPECTION END
- NO >> Go to [EC-179. "Diagnosis Procedure"](#).

7. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform Component Function Check. Refer to [EC-177. "Component Function Check"](#).

NOTE:

Use component function check to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to [EC-179. "Diagnosis Procedure"](#).

Component Function Check

INFOID:000000005398362

1. PERFORM COMPONENT FUNCTION CHECK

 **With GST**

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.

P0130 A/F SENSOR 1

< COMPONENT DIAGNOSIS >

[HR16DE]

3. Shift the selector lever to the D position (A/T) or 1st position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (31 MPH).

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

Never apply brake during releasing the accelerator pedal.

4. Repeat steps 2 to 3 for five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 for five times.
8. Stop the vehicle.
9. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-179, "Diagnosis Procedure"](#).
NO >> INSPECTION END

P0130 A/F SENSOR 1

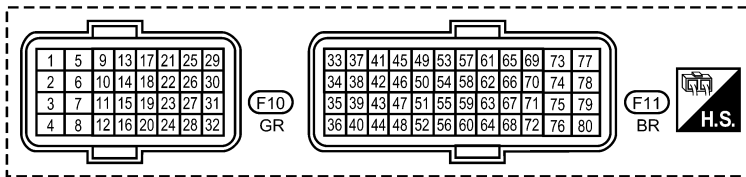
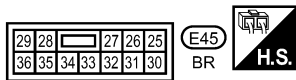
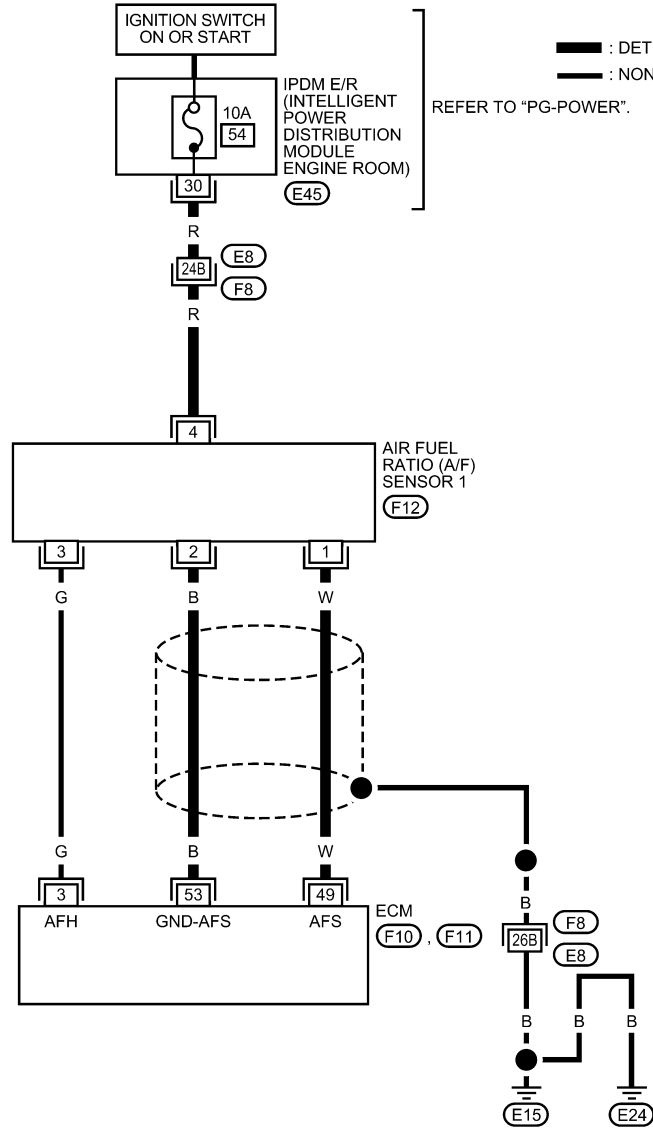
< COMPONENT DIAGNOSIS >

[HR16DE]

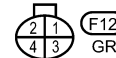
Wiring Diagram

INFOID:000000005398363

EC-A/F-01



REFER TO THE FOLLOWING.
 (F8) - SUPER MULTIPLE JUNCTION (SMJ)



AABWA0307GB

Diagnosis Procedure

INFOID:000000005398364

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119. "Ground Inspection"](#).

Is the inspection result normal?

P0130 A/F SENSOR 1

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
 NO >> Repair or replace ground connection.

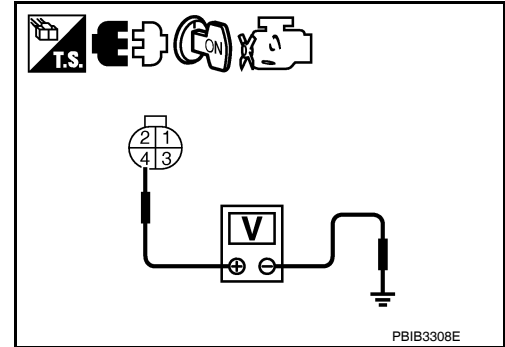
2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F12	4	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- IPDM E/R harness connector E45
- 10 A fuse (No. 54)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

5. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK INTERMITTENT INCIDENT

Perform [EC-114. "Diagnosis Procedure"](#).

P0130 A/F SENSOR 1

[HR16DE]

< COMPONENT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

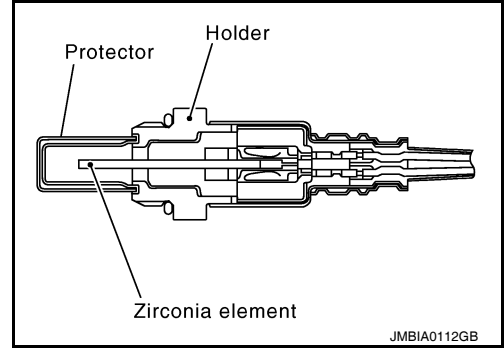
P

P0131 A/F SENSOR 1

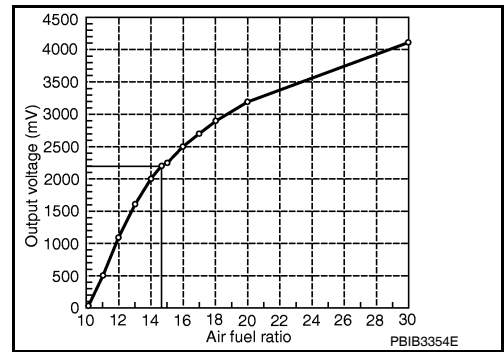
Description

INFOID:000000005398365

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element. The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range. The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



DTC Logic

INFOID:000000005398366

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately low.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0131	Air fuel ratio (A/F) sensor 1 circuit low voltage	<ul style="list-style-type: none"> The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0 V. 	<ul style="list-style-type: none"> Harness or connectors (The A/F sensor 1 circuit is open or shorted.) A/F sensor 1

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 2.

2. CHECK A/F SENSOR FUNCTION

With CONSULT-III

- Start engine and warm it up to normal operating temperature.
- Select "A/F SEN1 (B1)" in "DATA MONITOR" mode with CONSULT-III.
- Check "A/F SEN1 (B1)" indication.

With GST

Follow the procedure "With CONSULT-III" above.

Is the indication constantly approx. 0 V?

P0131 A/F SENSOR 1

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> Go to [EC-184. "Diagnosis Procedure"](#).
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.

CAUTION:

Always drive vehicle at a safe speed.

3. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	Suitable position

NOTE:

- Keep the accelerator pedal as steady as possible during the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 1, return to step 1.

4. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

- YES >> Go to [EC-184. "Diagnosis Procedure"](#).
NO >> INSPECTION END

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

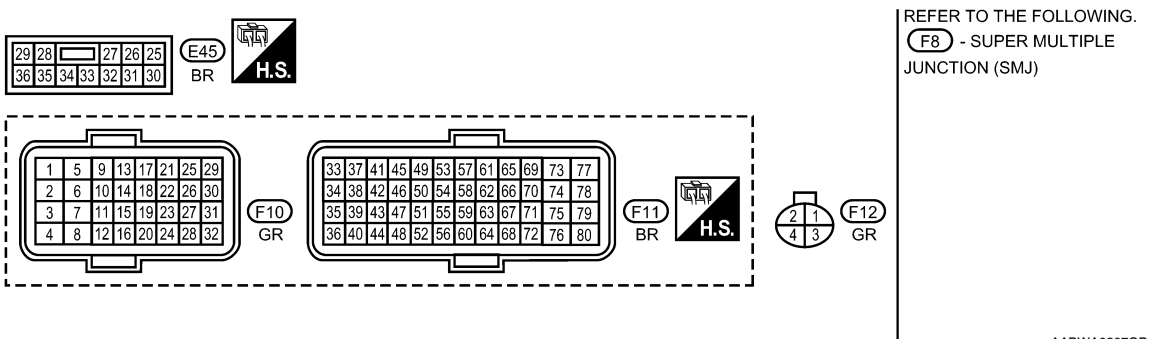
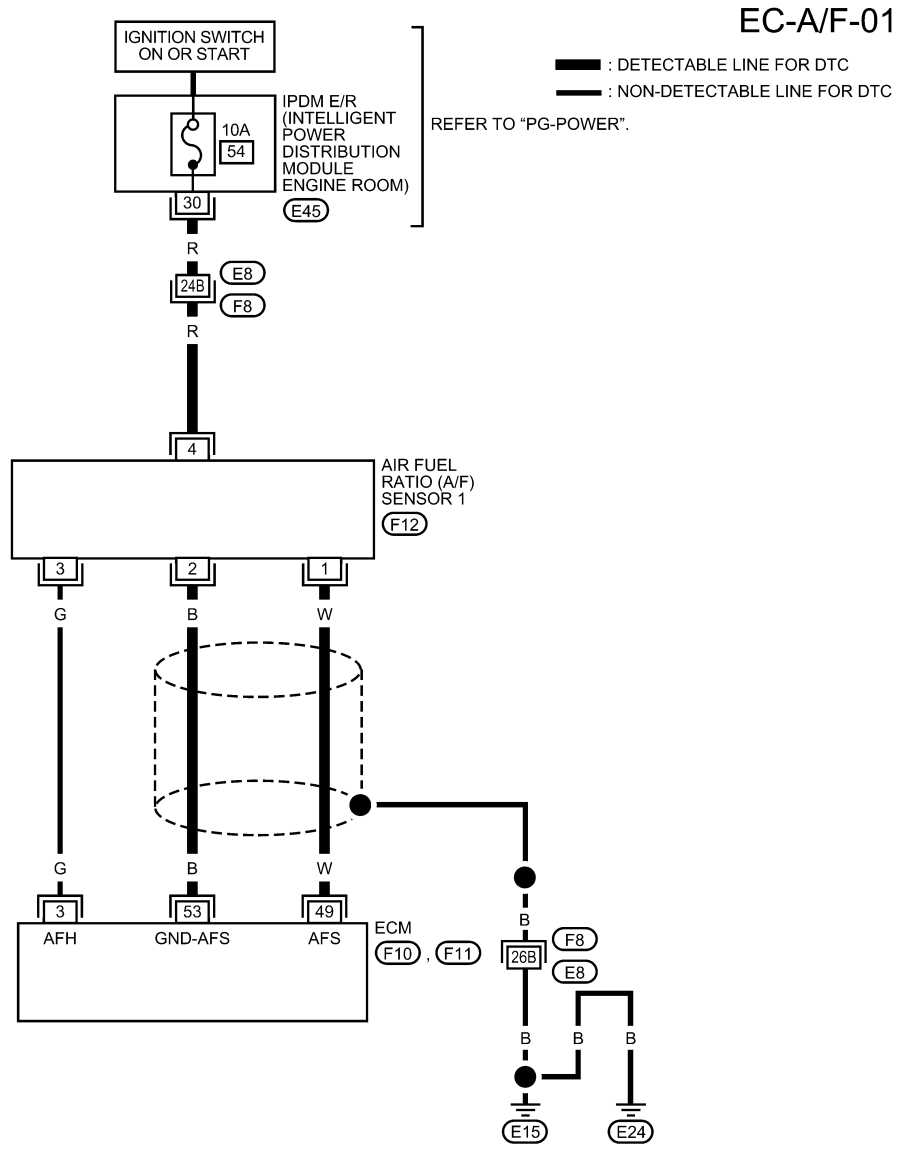
P0131 A/F SENSOR 1

< COMPONENT DIAGNOSIS >

[HR16DE]

Wiring Diagram

INFOID:000000005398367



AABWA0307GB

Diagnosis Procedure

INFOID:000000005398368

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

P0131 A/F SENSOR 1

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
 NO >> Repair or replace ground connection.

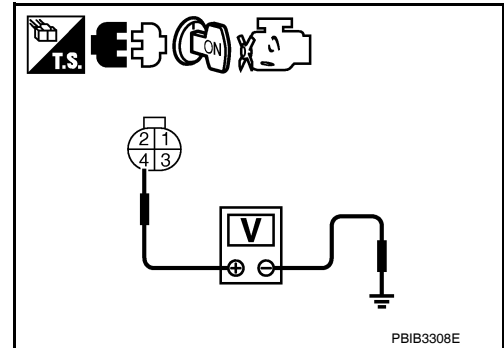
2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F12	4	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- IPDM E/R harness connector E45
- 10 A fuse (No. 54)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

5. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK INTERMITTENT INCIDENT

P0131 A/F SENSOR 1

[HR16DE]

< COMPONENT DIAGNOSIS >

Perform [EC-114, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

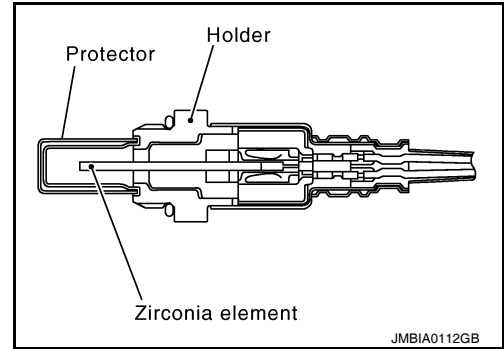
>> INSPECTION END

P0132 A/F SENSOR 1

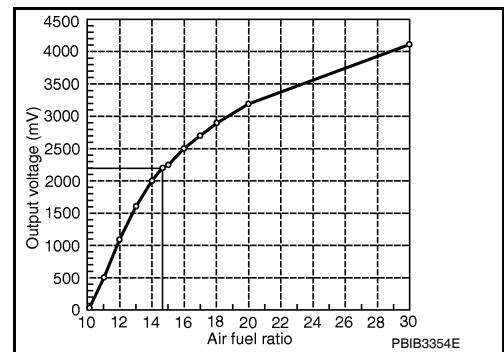
Description

INFOID:000000005398369

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element. The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range. The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



DTC Logic

INFOID:000000005398370

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately high.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	Air fuel ratio (A/F) sensor 1 circuit high voltage	<ul style="list-style-type: none"> The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5 V. 	<ul style="list-style-type: none"> Harness or connectors (The A/F sensor 1 circuit is open or shorted.) A/F sensor 1

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 2.

2. CHECK A/F SENSOR FUNCTION

With CONSULT-III

- Start engine and warm it up to normal operating temperature.
- Select "A/F SEN1 (B1)" in "DATA MONITOR" mode with CONSULT-III.
- Check "A/F SEN1 (B1)" indication.

With GST

Follow the procedure "With CONSULT-III" above.

Is the indication constantly approx. 5 V?

- YES >> Go to [EC-189. "Diagnosis Procedure"](#).
 NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

 **With CONSULT-III**

1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.

CAUTION:

Always drive vehicle at a safe speed.

3. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	Suitable position

NOTE:

- Keep the accelerator pedal as steady as possible during the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 1, return to step 1.

4. Check 1st trip DTC.

 **With GST**

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC is detected?

- YES >> Go to [EC-189. "Diagnosis Procedure"](#).
 NO >> INSPECTION END

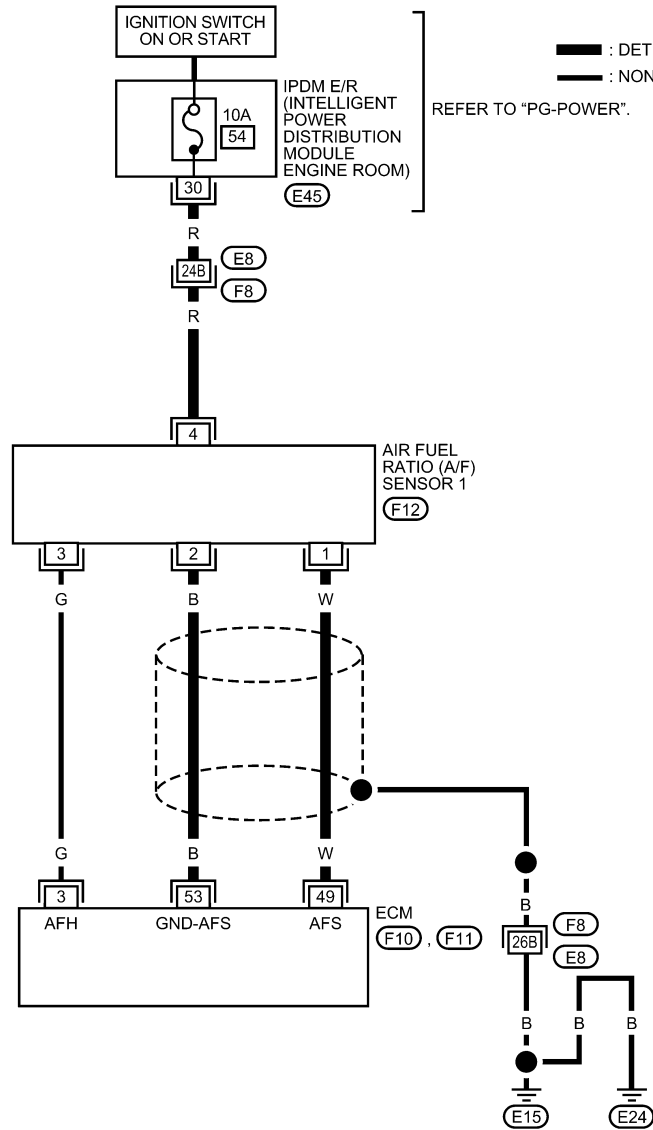
P0132 A/F SENSOR 1

< COMPONENT DIAGNOSIS >

[HR16DE]

Wiring Diagram

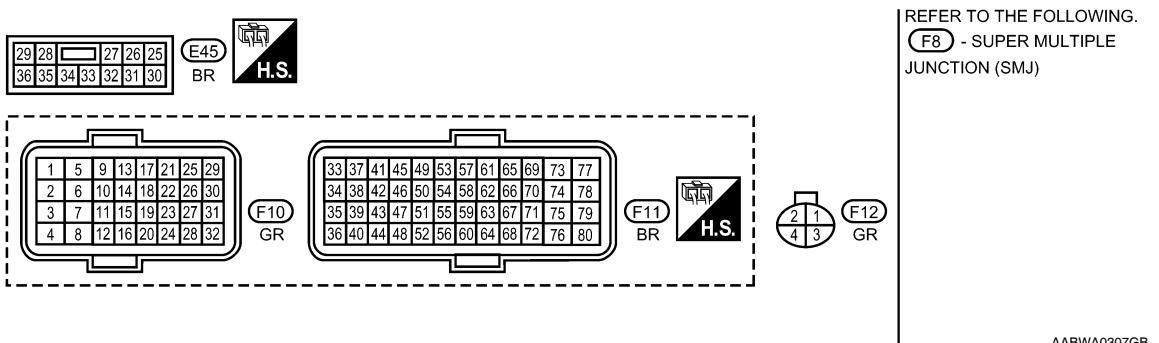
INFOID:000000005398371



EC-A/F-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC

REFER TO "PG-POWER".



Diagnosis Procedure

INFOID:000000005398372

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

P0132 A/F SENSOR 1

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
 NO >> Repair or replace ground connection.

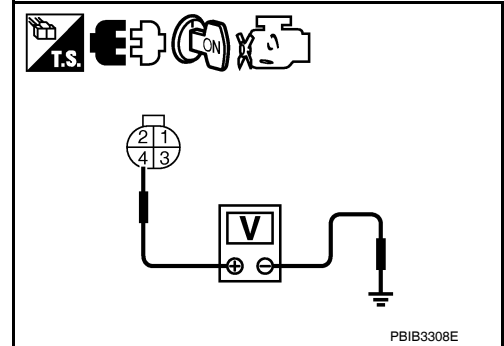
2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F12	4	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- IPDM E/R harness connector E45
- 10 A fuse (No. 54)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

5. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK INTERMITTENT INCIDENT

P0132 A/F SENSOR 1

[HR16DE]

< COMPONENT DIAGNOSIS >

Perform [EC-114. "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

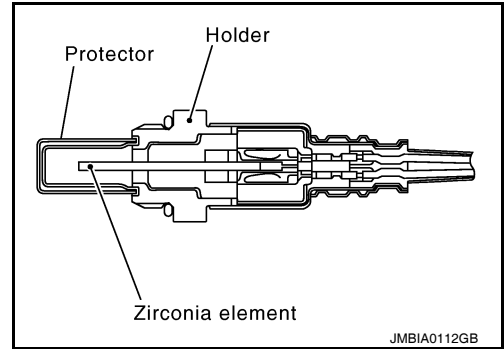
P

P0133 A/F SENSOR 1

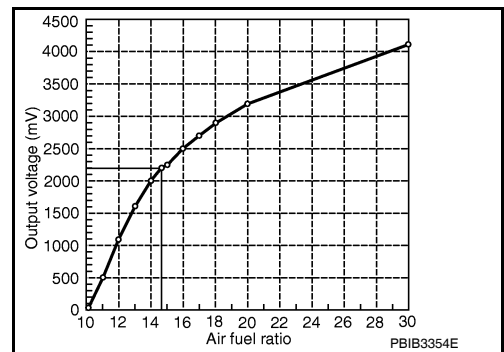
Description

INFOID:000000005398373

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element. The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range. The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



DTC Logic

INFOID:000000005398374

DTC DETECTION LOGIC

To judge the malfunction of A/F sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the A/F sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the A/F sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0133	Air fuel ratio (A/F) sensor 1 circuit slow response	<ul style="list-style-type: none"> The response of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time. 	<ul style="list-style-type: none"> Harness or connectors (The A/F sensor 1 circuit is open or shorted.) A/F sensor 1 A/F sensor 1 heater Fuel pressure Fuel injector Intake air leaks Exhaust gas leaks PCV Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

Do you have CONSULT-III?

- YES >> GO TO 2.
- NO >> GO TO 5.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

< COMPONENT DIAGNOSIS >

 **With CONSULT-III**

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "A/F SEN1(B1) P1278/P1279" of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III.
6. Touch "START".

Is "COMPLETED" displayed on COUSULT-III?

- YES >> GO TO 3
 NO >> GO TO 4.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT-III?

- OK >> INSPECTION END
 NG >> Go to [EC-195. "Diagnosis Procedure"](#).

4.PERFORM DTC CONFIRMATION PROCEDURE

1. After perform the following procedure, "TESTING" will be displayed on the CONSULT-III screen.
 - Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
 - Fully release accelerator pedal and then let engine idle for about 10 seconds.

If "TESTING" is not displayed after 10 seconds, go to [EC-106. "Component Function Check"](#).
2. Wait for about 20 seconds at idle under the condition that "TESTING" is displayed on the CONSULT-III screen.
3. Make sure that "TESTING" changes to "COMPLETED".
If "TESTING" changed to "OUT OF CONDITION", go to [EC-106. "Component Function Check"](#).
4. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT-III?

- OK >> INSPECTION END
 NG >> Go to [EC-195. "Diagnosis Procedure"](#).

5.CHECK AIR-FUEL RATIO SELF-LEARNING VALUE

 **With GST**

1. Start engine and warm it up to normal operating temperature.
2. Select Service \$01 with GST.
3. Calculate the total value of "Short-term fuel trim" and "Long-term fuel trim" indications.

Is the total percentage within $\pm 15\%$?

- YES >> GO TO 7.
 NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Intake air leaks
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Fuel injector
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor

>> Repair or replace malfunctioning part.

7.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
3. Let engine idle for 1 minute.
4. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.

P0133 A/F SENSOR 1

[HR16DE]

< COMPONENT DIAGNOSIS >

5. Fully release accelerator pedal and then let engine idle for about 1 minute.
6. Check 1st trip DTC detected?.

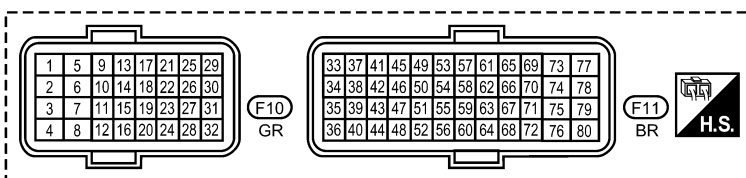
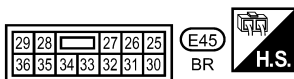
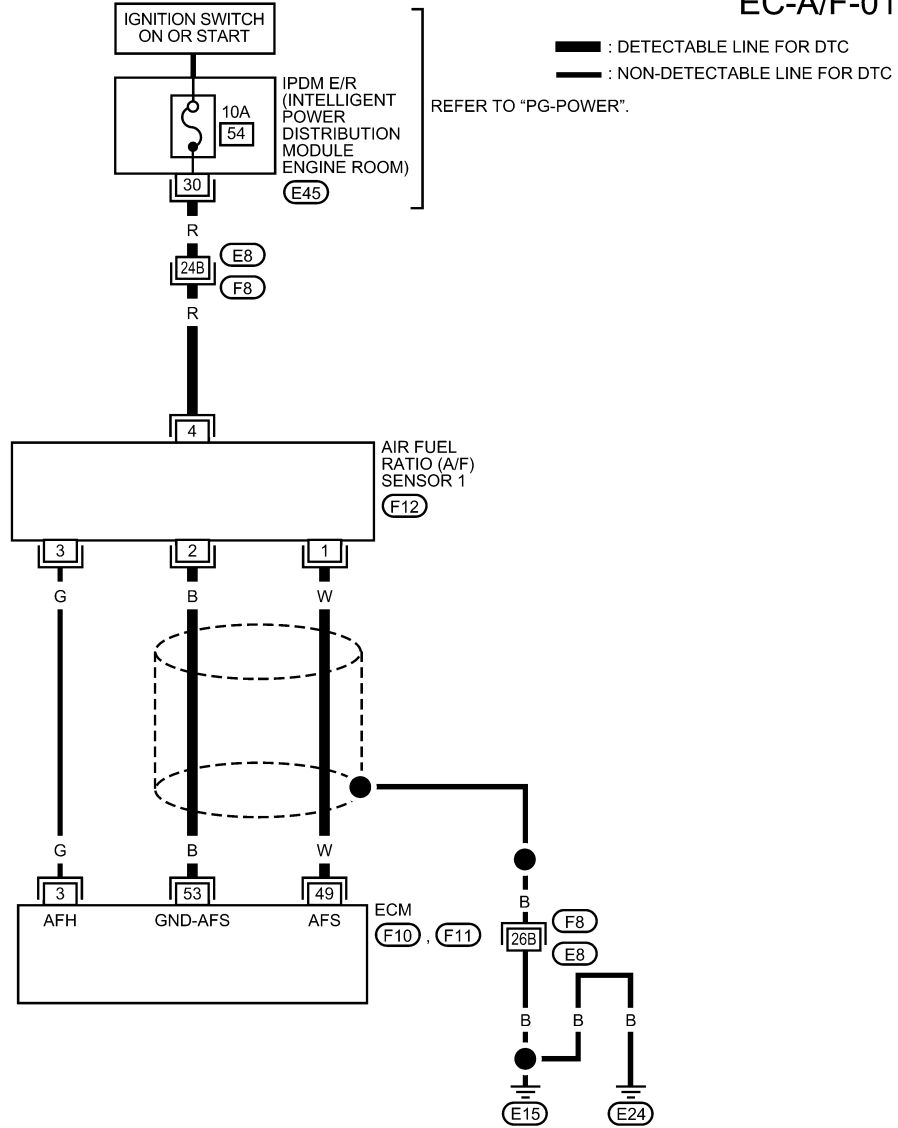
Is 1st trip DTC detected?

- YES >> Go to [EC-195. "Diagnosis Procedure"](#).
 NO >> INSPECTION END

Wiring Diagram

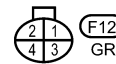
INFOID:000000005398375

EC-A/F-01



REFER TO THE FOLLOWING.

(F8) - SUPER MULTIPLE JUNCTION (SMJ)



AABWA0307GB

Diagnosis Procedure

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Repair or replace ground connection.

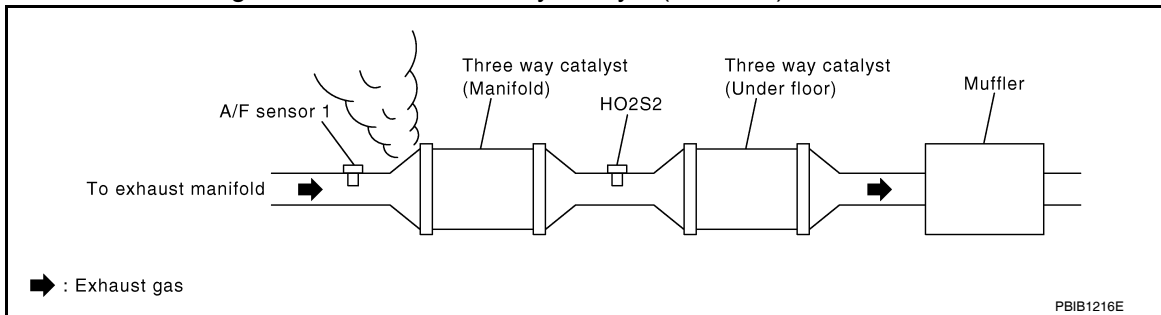
2. RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1. Refer to [EM-31, "Exploded View"](#).

>> GO TO 3.

3. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

- YES >> Repair or replace.
 NO >> GO TO 4.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

- YES >> Repair or replace.
 NO >> GO TO 5.

5. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to [EC-27, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement"](#).
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P172 detected? Is it difficult to start engine?

- YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to [EC-223, "DTC Logic"](#) or [EC-229, "DTC Logic"](#).
 NO >> GO TO 6.

6. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.

P0133 A/F SENSOR 1

[HR16DE]

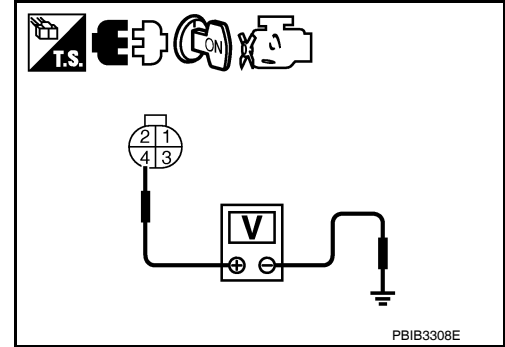
< COMPONENT DIAGNOSIS >

- Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F12	4	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 7.



7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- IPDM E/R harness connector E45
- 10 A fuse (No. 54)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

- Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

- Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to [EC-133. "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 10.
NO >> GO TO 13.

10. CHECK MASS AIR FLOW SENSOR

P0133 A/F SENSOR 1

[HR16DE]

< COMPONENT DIAGNOSIS >

Refer to [EC-147, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace mass air flow sensor.

11. CHECK PCV VALVE

Refer to [EC-449, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace PCV valve.

12. CHECK INTERMITTENT INCIDENT

Perform [EC-114, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace.

13. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

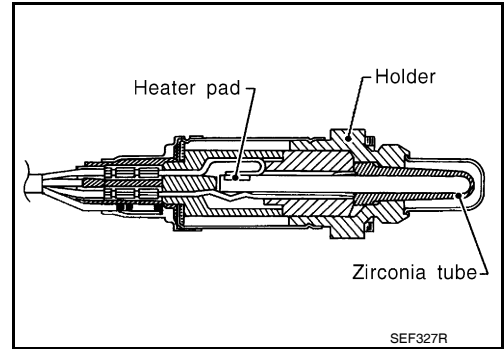
P

P0137 HO2S2

Description

INFOID:000000005398377

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2. This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions. Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



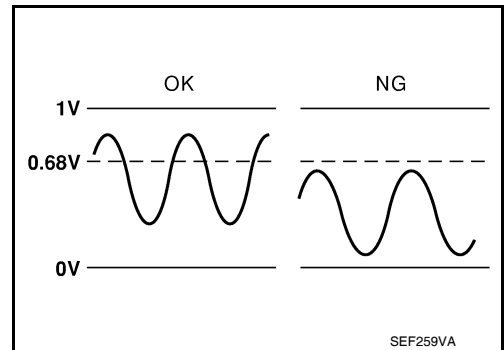
SEF327R

DTC Logic

INFOID:000000005398378

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



SEF259VA

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0137	Heated oxygen sensor 2 circuit low voltage	The maximum voltage from the sensor is not reached to the specified voltage.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 5.

2.PRECONDITIONING

If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

< COMPONENT DIAGNOSIS >

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
7. Open engine hood.
8. Select "HO2S2 (B1) P1147" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
9. Follow the instruction of CONSULT-III.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

10. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT-III screen?

- OK >> INSPECTION END
- NG >> Go to [EC-201. "Diagnosis Procedure"](#).
- CAN NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to [EC-199. "Component Function Check"](#).

NOTE:

Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to [EC-201. "Diagnosis Procedure"](#).

Component Function Check

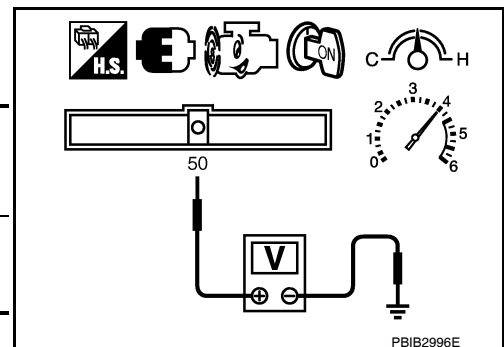
INFOID:000000005398379

1.PERFORM COMPONENT FUNCTION CHECK-I

⊗ Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Con- nector	Termi- nal			
F11	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure.



Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK-II

P0137 HO2S2

[HR16DE]

< COMPONENT DIAGNOSIS >

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Con- nector	Termi- nal			
F11	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

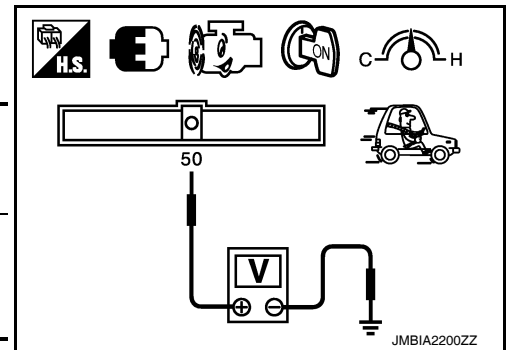
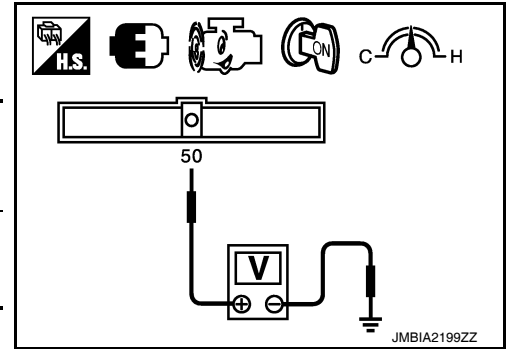
Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Con- nector	Termi- nal			
F11	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

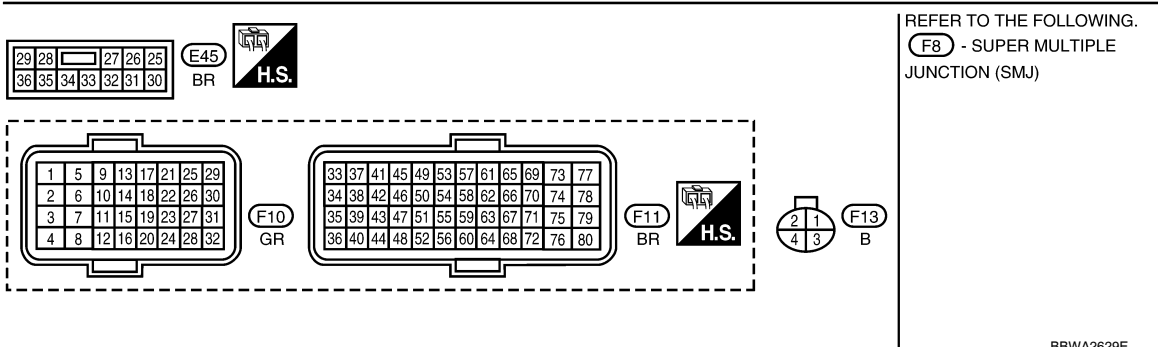
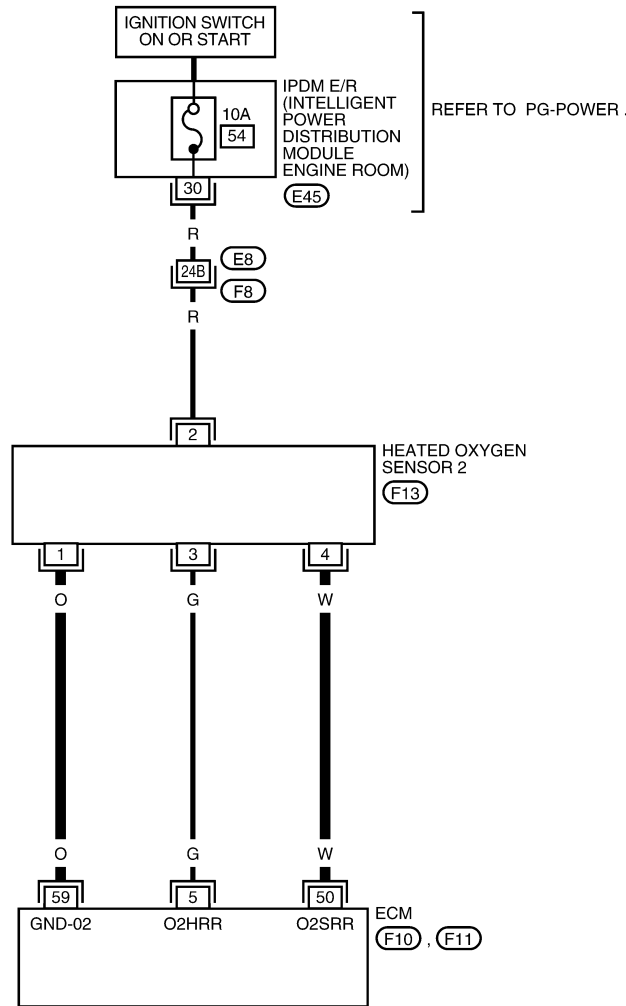
NO >> Go to [EC-201, "Diagnosis Procedure"](#).



Wiring Diagram

EC-HO2S2-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA2629E

Diagnosis Procedure

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119. "Ground Inspection"](#).

Is the inspection result normal?

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

2. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to [EC-27. "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement"](#).
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

- YES >> Perform trouble diagnosis for DTC P0171. Refer to [EC-223. "DTC Logic"](#).
- NO >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	1	F11	59	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	4	F11	50	Existed

2. Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

HO2S2		Ground	Continuity
Connector	Terminal		
F13	4	Ground	Not existed

ECM		Ground	Continuity
Connector	Terminal		
F11	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to [EC-203. "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

< COMPONENT DIAGNOSIS >

Replace heated oxygen sensor 2.

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-114. "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398382

1. INSPECTION START

Do you have CONSULT-III?

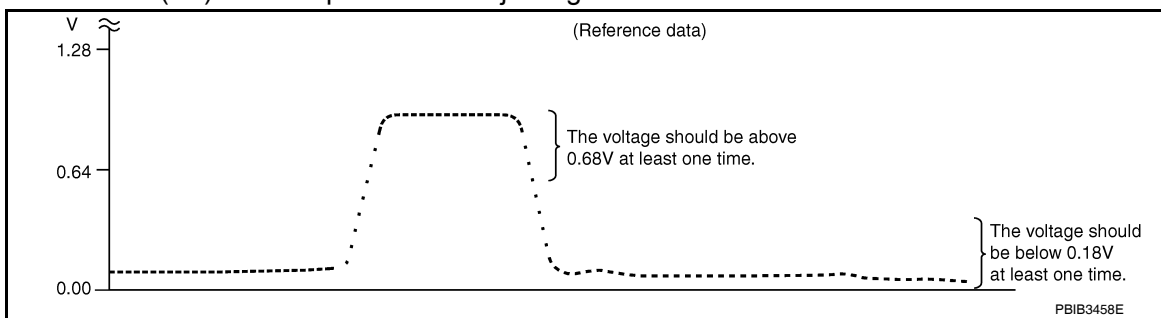
Do you have CONSULT-III?

- YES >> GO TO 2.
- NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-III.
7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)" should be above 0.68 V at least once when the "FUEL INJECTION" is + 25%.
"HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is - 25%.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

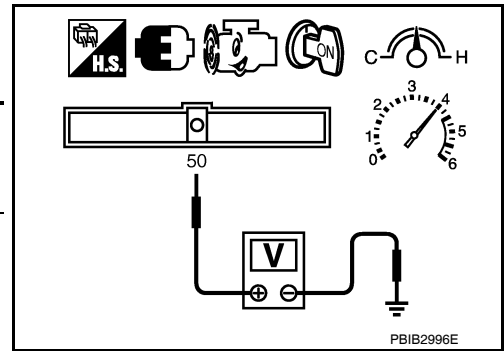
Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.

< COMPONENT DIAGNOSIS >

5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Con- nector	Termi- nal			
F11	50 (HO2S2 signal)	Ground	Revvng up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.



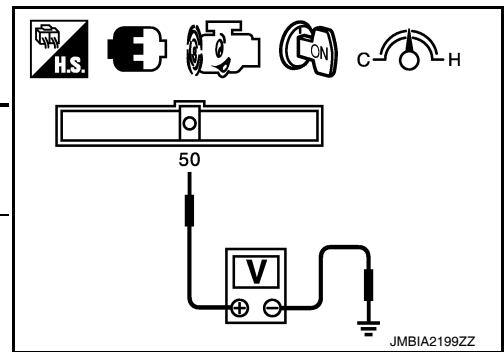
Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Con- nector	Termi- nal			
F11	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.



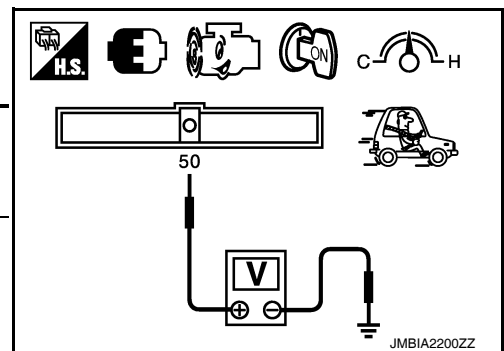
Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 5.

5.CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Con- nector	Termi- nal			
F11	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.



Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

P0137 HO2S2

< COMPONENT DIAGNOSIS >

[HR16DE]

- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

A

>> INSPECTION END

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

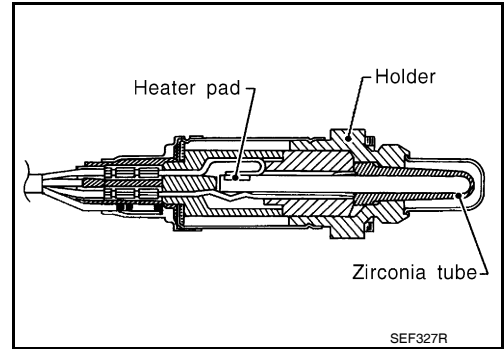
P

P0138 HO2S2

Description

INFOID:000000005398383

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2. This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions. Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



DTC Logic

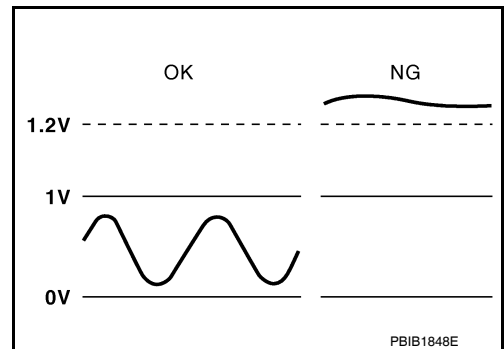
INFOID:000000005398384

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time.

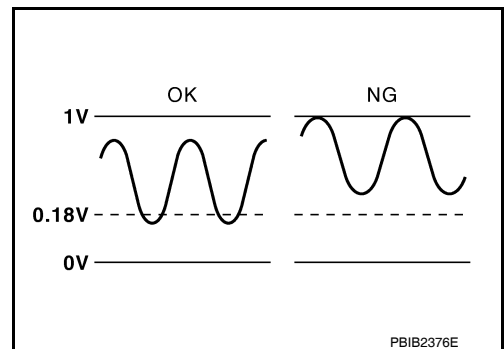
MALFUNCTION A

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



MALFUNCTION B

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0138	Heated oxygen sensor 2 circuit high voltage	A)	An excessively high voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2
		B)	The minimum voltage from the sensor is not reached to the specified voltage.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 2 minutes.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to [EC-209, "Diagnosis Procedure"](#).

NO-1 >> With CONSULT-III: GO TO 3.

NO-2 >> Without CONSULT-III: GO TO 5.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B**NOTE:**

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that "COOLAN TEMP/S" indication is more than 70°C (158°F).
If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
7. Open engine hood.
8. Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
9. Follow the instruction of CONSULT-III.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

10. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT-III

OK >> INSPECTION END

NG >> Go to [EC-209, "Diagnosis Procedure"](#).

CAN NOT BE DIAGNOSED>>GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B AGAIN

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

5. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to [EC-209, "Diagnosis Procedure"](#).

NOTE:

Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to [EC-209, "Diagnosis Procedure"](#).

Component Function Check

INFOID:000000005398385

1. PERFORM COMPONENT FUNCTION CHECK-I

⊗ Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Con-connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.18 V at least once during this procedure.

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Con-connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.18 V at least once during this procedure.

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> GO TO 3.

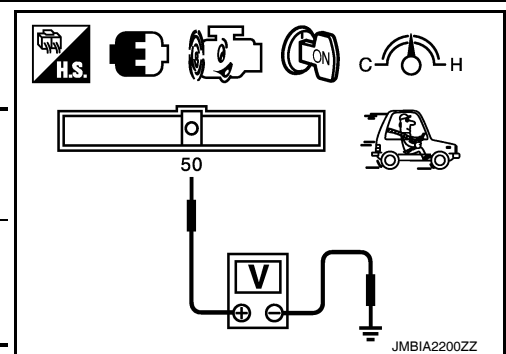
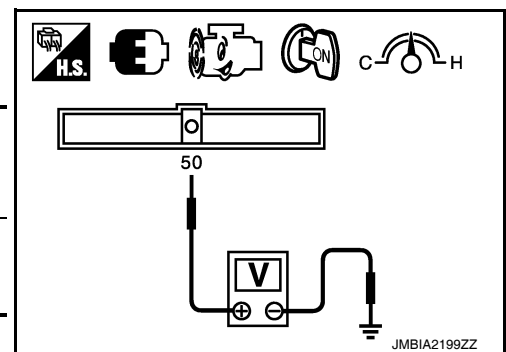
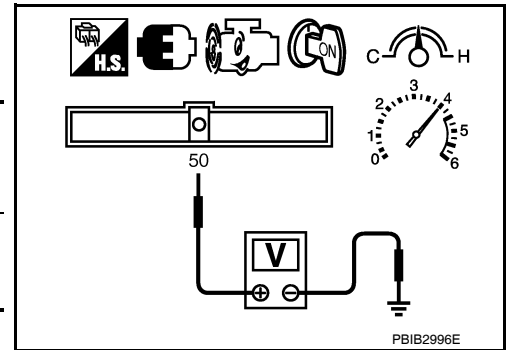
3. PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Con-connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T)	The voltage should be above 0.18 V at least once during this procedure.

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Go to [EC-209, "Diagnosis Procedure"](#).

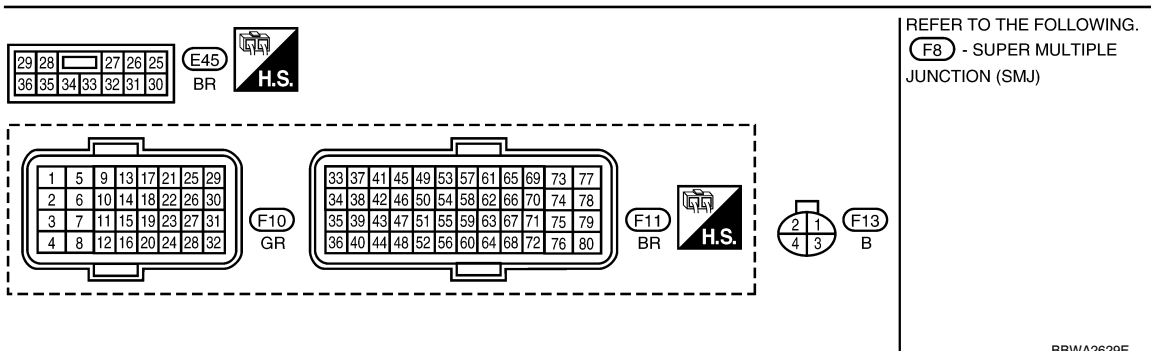
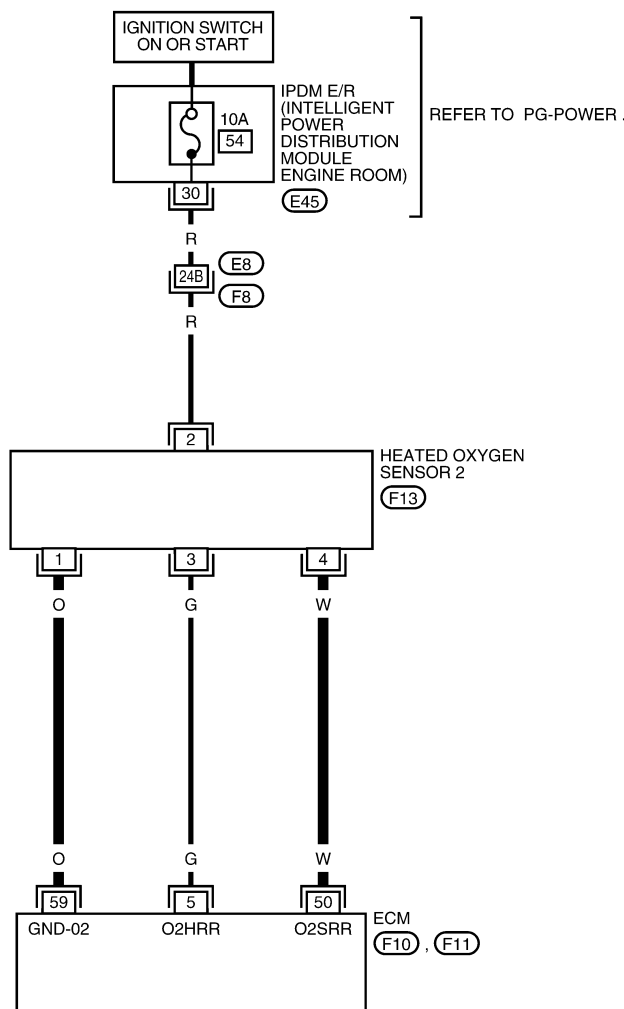


Wiring Diagram

INFOID:000000005398386

EC-HO2S2-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



Diagnosis Procedure

INFOID:000000005398387

1. INSPECTION START

Confirm the detected malfunction (A or B). Refer to [EC-206, "DTC Logic"](#).
Which malfunction is detected?

< COMPONENT DIAGNOSIS >

- A >> GO TO 2.
- B >> GO TO 9.

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119. "Ground Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Repair or replace ground connection.

3.CHECK HO2S2 CONNECTOR FOR WATER

1. Disconnect heated oxygen sensor 2 harness connector.
2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair or replace harness or connectors.

4.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	1	F11	59	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	4	F11	50	Existed

2. Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

HO2S2		Ground	Continuity
Connector	Terminal		
F13	4	Ground	Not existed

ECM		Ground	Continuity
Connector	Terminal		
F11	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK HEATED OXYGEN SENSOR 2

< COMPONENT DIAGNOSIS >

Refer to [EC-212, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

7. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

9. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace ground connection.

10. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to [EC-27, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement"](#).
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

- YES >> Perform trouble diagnosis for DTC P0172. Refer to [EC-229, "DTC Logic"](#).
- NO >> GO TO 11.

11. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	1	F11	59	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 12.
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

< COMPONENT DIAGNOSIS >

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	4	F11	50	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		Ground	Continuity
Connector	Terminal		
F13	4	Ground	Not existed

ECM		Ground	Continuity
Connector	Terminal		
F11	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 13.
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.

13.CHECK HEATED OXYGEN SENSOR 2

Refer to [EC-212, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 15.
- NO >> GO TO 14.

14.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

15.CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398388

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

- YES >> GO TO 2.
- NO >> GO TO 3.

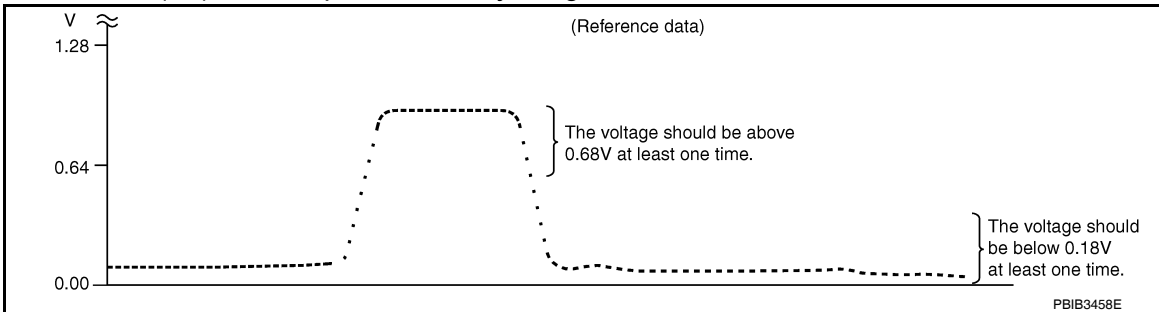
2.CHECK HEATED OXYGEN SENSOR 2

ⓅWith CONSULT-III

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.

< COMPONENT DIAGNOSIS >

5. Let engine idle for 1 minute.
6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-III.
7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)" should be above 0.68 V at least once when the "FUEL INJECTION" is + 25%.
 "HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is - 25%.

Is the inspection result normal?

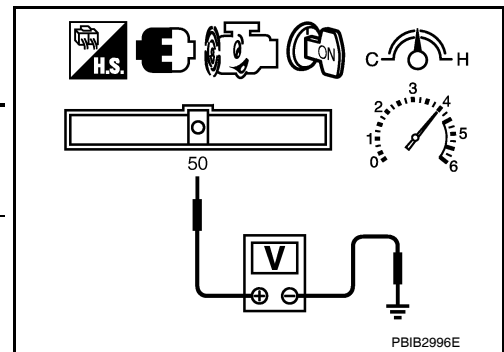
- YES >> INSPECTION END
 NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Con-connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Reving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.



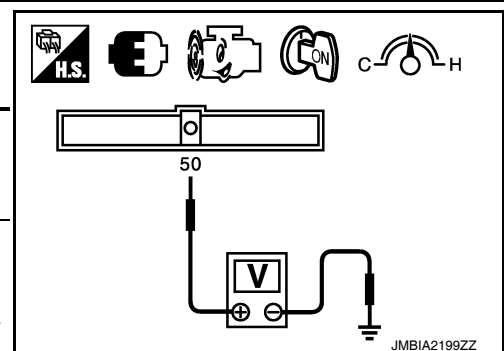
Is the inspection result normal?

- YES >> INSPECTION END
 NO >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Con-connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.



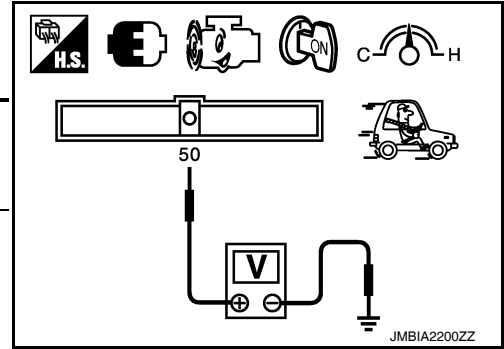
Is the inspection result normal?

- YES >> INSPECTION END
 NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Con- nector	Termi- nal			
F11	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.



Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

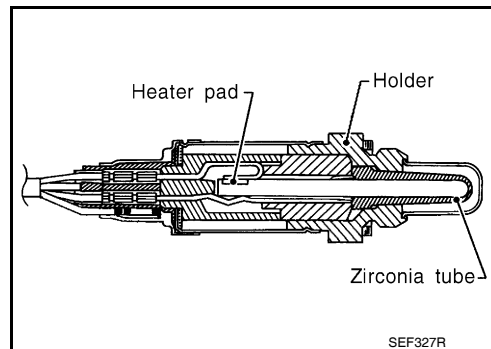
>> INSPECTION END

P0139 HO2S2

Description

INFOID:000000005398389

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2. This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions. Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

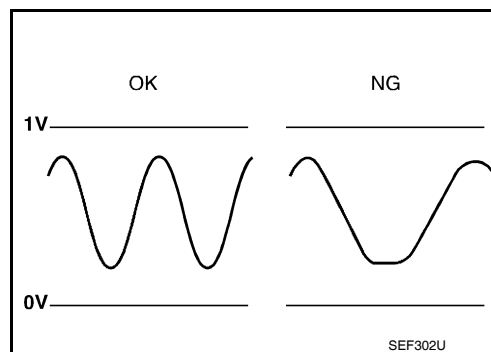


DTC Logic

INFOID:000000005398390

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
2. Start engine and warm it up to normal operating temperature.

< COMPONENT DIAGNOSIS >

3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Select "HO2S2 (B1) P0139" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
7. Follow the instruction of CONSULT-III.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

8. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT-III?

- OK >> INSPECTION END
- NG >> GO TO 4.
- CAN NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM THE RESULT OF DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to [EC-216, "Component Function Check"](#).

NOTE:

Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to [EC-218, "Diagnosis Procedure"](#).

Component Function Check

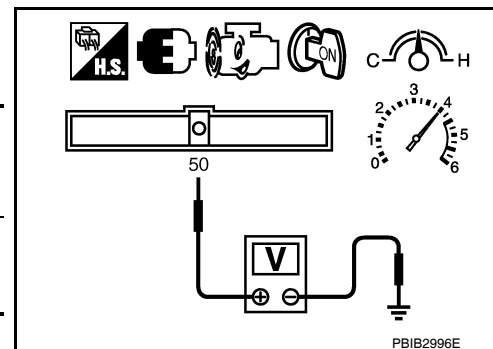
INFOID:000000005398391

1.PERFORM COMPONENT FUNCTION CHECK-I

⊗Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Con- nector	Terminal			
F11	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.30 V at least once during this procedure.



Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK-II

P0139 HO2S2

[HR16DE]

< COMPONENT DIAGNOSIS >

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Con- nector	Termi- nal			
F11	33 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.30 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

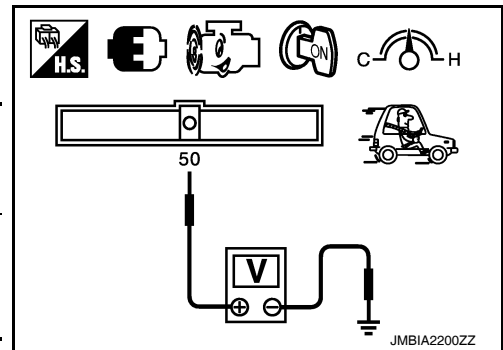
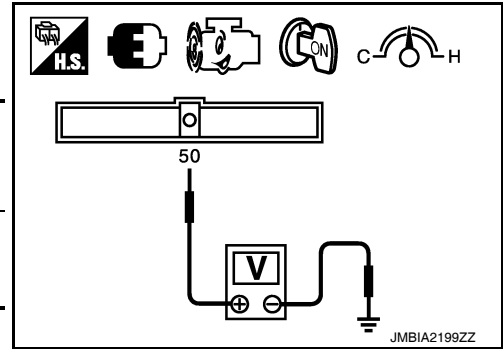
Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Con- nector	Termi- nal			
F11	33 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T)	The voltage should be above 0.30 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to [EC-218, "Diagnosis Procedure"](#).



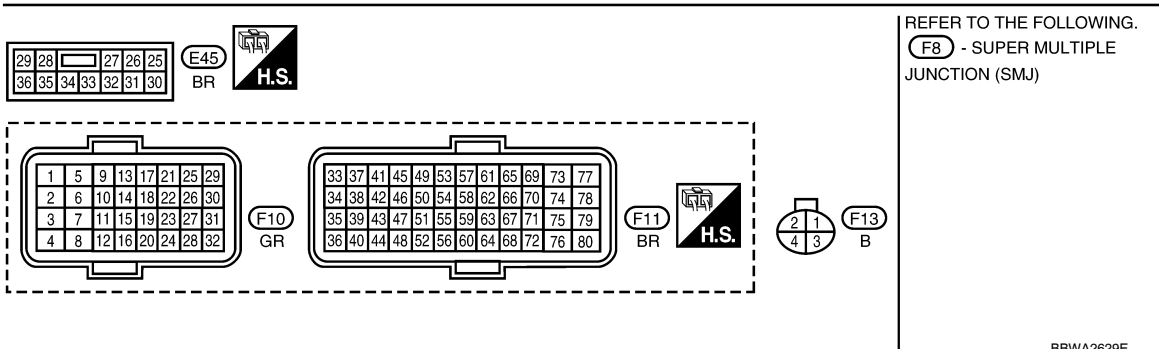
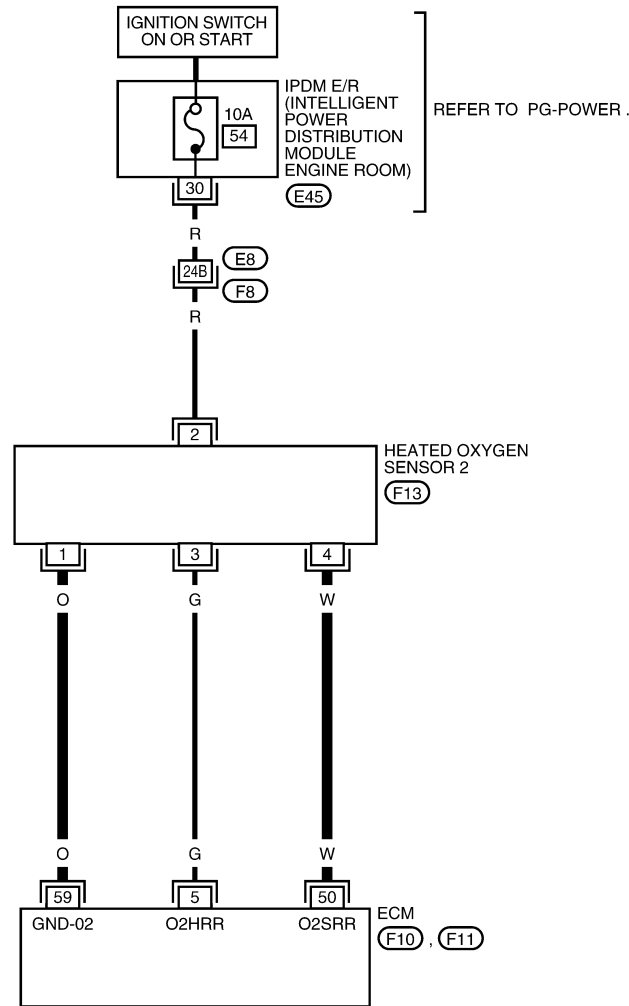
A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

Wiring Diagram

INFOID:000000005398392

EC-HO2S2-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA2629E

Diagnosis Procedure

INFOID:000000005398393

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

2. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to [EC-27. "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement"](#).
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

- YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to [EC-223. "DTC Logic"](#) or [EC-229. "DTC Logic"](#).
- NO >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	1	F11	59	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	4	F11	50	Existed

2. Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

HO2S2		Ground	Continuity
Connector	Terminal		
F13	4	Ground	Not existed

ECM		Ground	Continuity
Connector	Terminal		
F11	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to [EC-220. "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-114. "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398394

1. INSPECTION START

Do you have CONSULT-III?

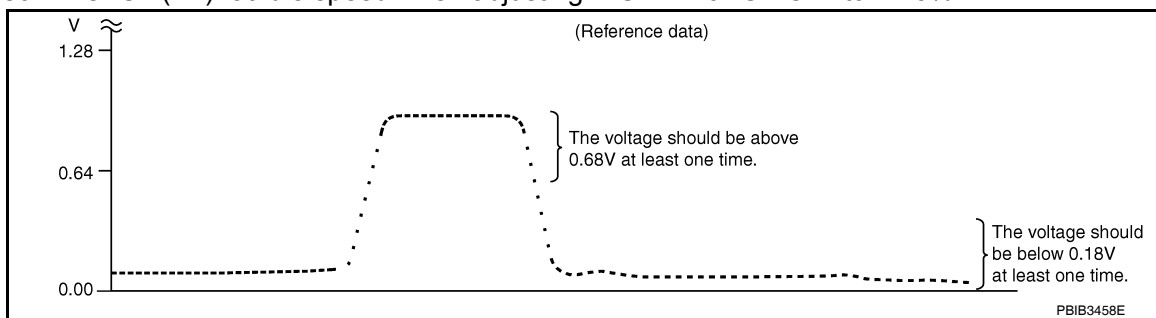
Do you have CONSULT-III?

- YES >> GO TO 2.
- NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2

Ⓜ With CONSULT-III

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-III.
7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



**"HO2S2 (B1)" should be above 0.68 V at least once when the "FUEL INJECTION" is + 25%.
 "HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is - 25%.**

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

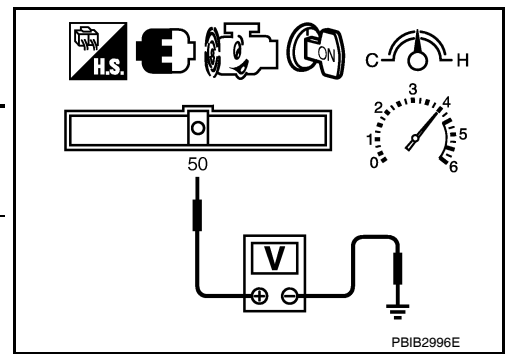
Ⓧ Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.

< COMPONENT DIAGNOSIS >

5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Con- nector	Termi- nal			
F11	50 (HO2S2 signal)	Ground	Reving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.



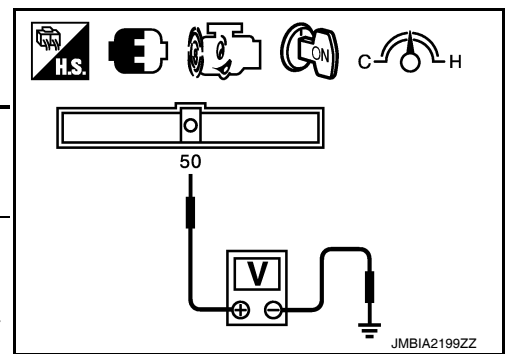
Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Con- nector	Termi- nal			
F11	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.



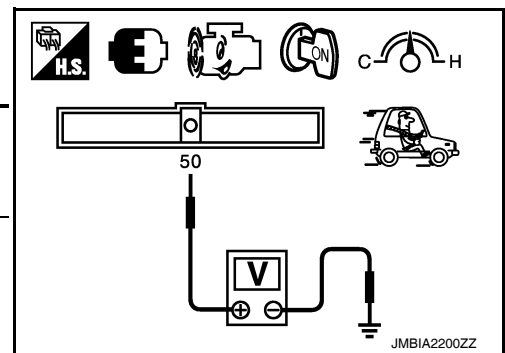
Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 5.

5.CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Con- nector	Termi- nal			
F11	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.



Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

P0139 HO2S2

< COMPONENT DIAGNOSIS >

[HR16DE]

- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

P0171 FUEL INJECTION SYSTEM FUNCTION

< COMPONENT DIAGNOSIS >

[HR16DE]

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:000000005398395

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171	Fuel injection system too lean	<ul style="list-style-type: none">Fuel injection system does not operate properly.The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	<ul style="list-style-type: none">Intake air leaksA/F sensor 1Fuel injectorExhaust gas leaksIncorrect fuel pressureLack of fuelMass air flow sensorIncorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- Clear the mixture ratio self-learning value. Refer to [EC-27, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement"](#).
- Start engine.

Is it difficult to start engine?

- YES >> GO TO 3.
NO >> GO TO 4.

3. RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.
Crank engine while depressing accelerator pedal.

NOTE:

When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

- YES >> Go to [EC-225, "Diagnosis Procedure"](#).
NO >> Check exhaust and intake air leak visually.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

- Start engine and let it idle for at least 5 minutes.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-225, "Diagnosis Procedure"](#).
NO >> GO TO 5.

P0171 FUEL INJECTION SYSTEM FUNCTION

< COMPONENT DIAGNOSIS >

[HR16DE]

5. PERFORM DTC CONFIRMATION PROCEDURE-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine.
3. Maintain the following conditions for at least 10 consecutive minutes.
Hold the accelerator pedal as steady as possible.

VHCL SPEED SE	50 - 120 km/h (31 - 75 MPH)
---------------	-----------------------------

CAUTION:

Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-225, "Diagnosis Procedure"](#).
NO >> INSPECTION END

P0171 FUEL INJECTION SYSTEM FUNCTION

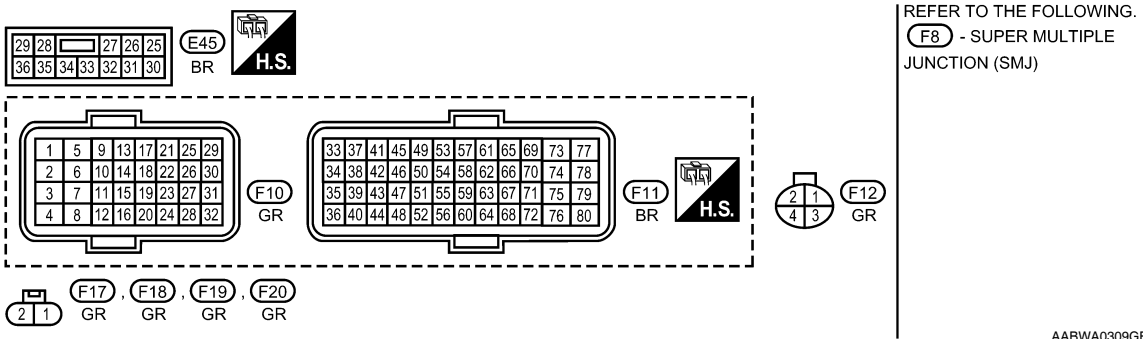
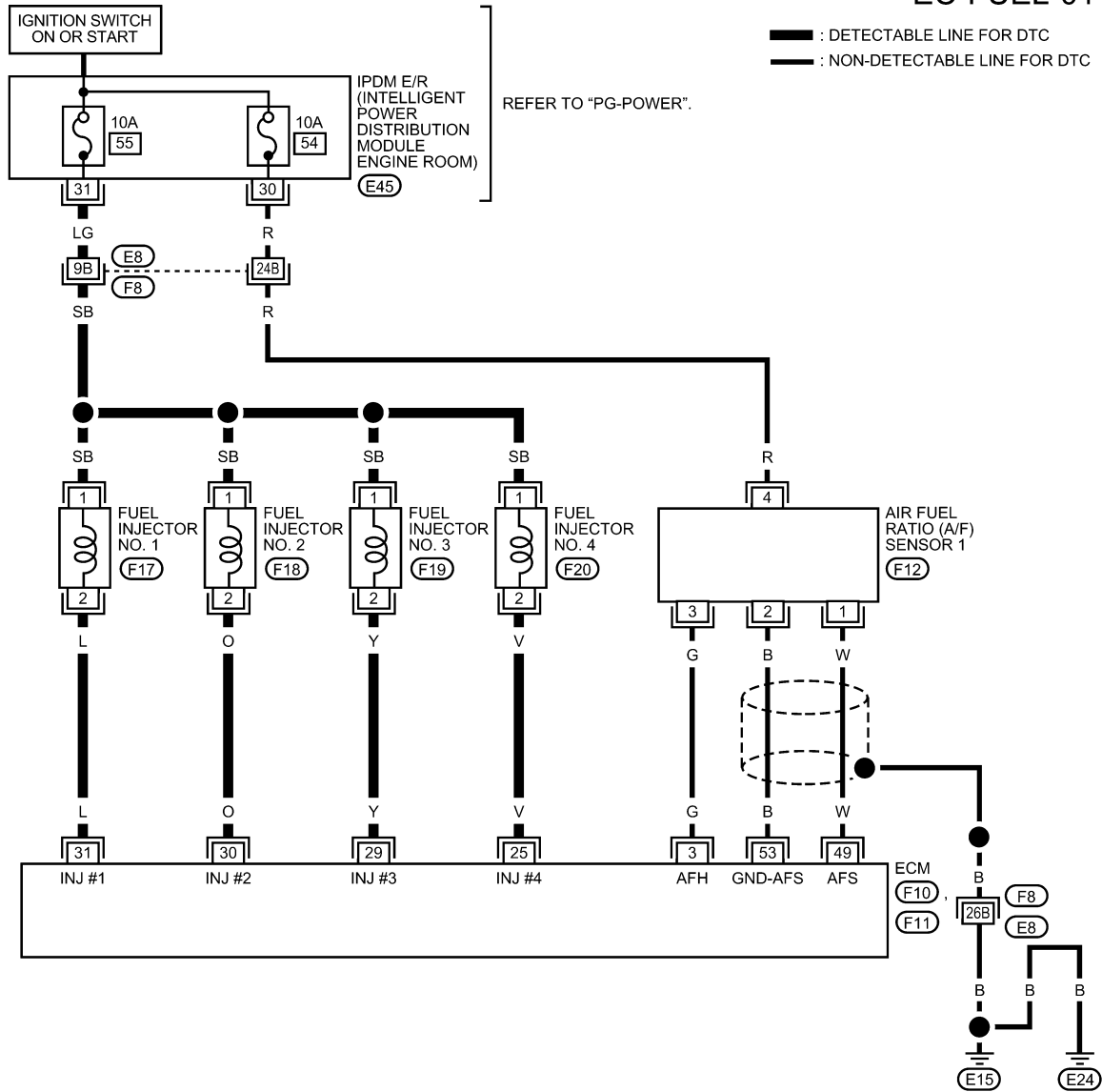
< COMPONENT DIAGNOSIS >

[HR16DE]

INFOID:000000005398396

Wiring Diagram

EC-FUEL-01



Diagnosis Procedure

INFOID:000000005398397

1. CHECK EXHAUST GAS LEAK

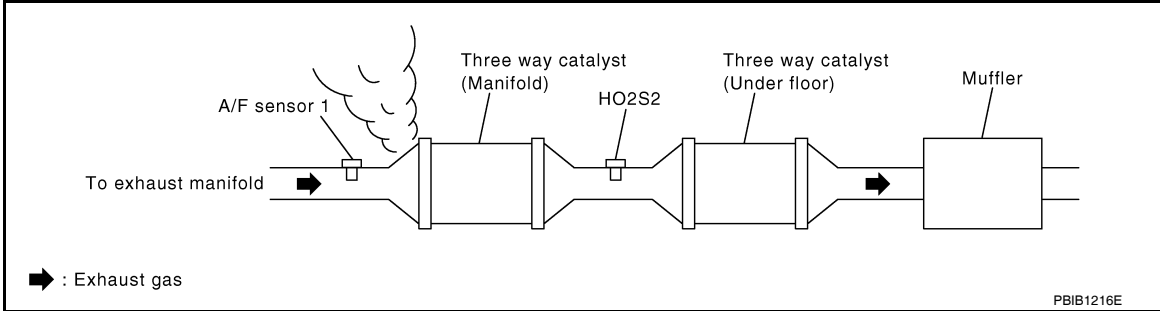
1. Start engine and run it at idle.

P0171 FUEL INJECTION SYSTEM FUNCTION

[HR16DE]

< COMPONENT DIAGNOSIS >

- Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

- YES >> Repair or replace.
 NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAK

- Listen for an intake air leak after the mass air flow sensor.
- Check PCV hose connection.

Intake air leak detected?

- YES >> Repair or replace.
 NO >> GO TO 3.

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

- Turn ignition switch OFF.
- Disconnect corresponding A/F sensor 1 harness connector.
- Disconnect ECM harness connector.
- Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

- Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

- Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL PRESSURE

- Check fuel pressure. Refer to [EC-496, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 6.

P0171 FUEL INJECTION SYSTEM FUNCTION

[HR16DE]

< COMPONENT DIAGNOSIS >

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly".

NO >> Repair or replace

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Install all removed parts.
2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III.
3. For specification, refer to [EC-502, "Mass Air Flow Sensor"](#).

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service \$01 with GST.
3. For specification, refer to [EC-502, "Mass Air Flow Sensor"](#).

Is the measurement value within the specification?

YES >> GO TO 7.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to [EC-142, "DTC Logic"](#).

7. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT-III

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-III

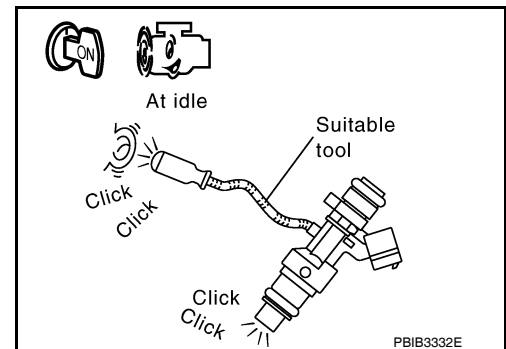
1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC-423, "Component Function Check"](#).



8. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Remove fuel tube assembly. Refer to [EM-34, "Removal and Installation"](#).
Keep fuel hose and all fuel injectors connected to fuel tube.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each fuel injector.

P0171 FUEL INJECTION SYSTEM FUNCTION

[HR16DE]

< COMPONENT DIAGNOSIS >

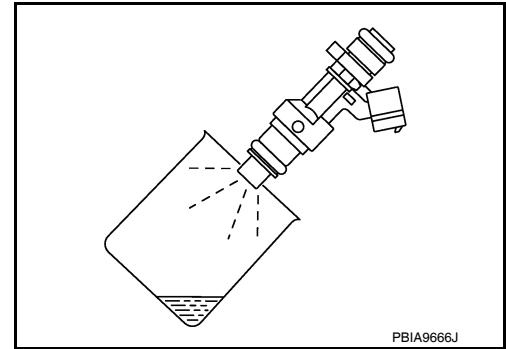
7. Crank engine for about 3 seconds.

Fuel should be sprayed evenly for each fuel injector.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones.



9. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

P0172 FUEL INJECTION SYSTEM FUNCTION

< COMPONENT DIAGNOSIS >

[HR16DE]

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:000000005398398

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172	Fuel injection system too rich	<ul style="list-style-type: none">Fuel injection system does not operate properly.The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	<ul style="list-style-type: none">A/F sensor 1Fuel injectorExhaust gas leaksIncorrect fuel pressureMass air flow sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to [EC-27, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement"](#).

2. Start engine.

Is it difficult to start engine?

YES >> GO TO 3.

NO >> GO TO 4.

3. RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.

Crank engine while depressing accelerator pedal.

NOTE:

When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Go to [EC-231, "Diagnosis Procedure"](#).

NO >> Check exhaust and intake air leak visually.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Start engine and let it idle for at least 5 minutes.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to [EC-231, "Diagnosis Procedure"](#).

NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE-III

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Start engine.

P0172 FUEL INJECTION SYSTEM FUNCTION

[HR16DE]

< COMPONENT DIAGNOSIS >

3. Maintain the following conditions for at least 10 consecutive minutes.
Hold the accelerator pedal as steady as possible.

VHCL SPEED SE	50 - 120 km/h (31 - 75 MPH)
---------------	-----------------------------

CAUTION:

Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-231, "Diagnosis Procedure"](#).
NO >> INSPECTION END

P0172 FUEL INJECTION SYSTEM FUNCTION

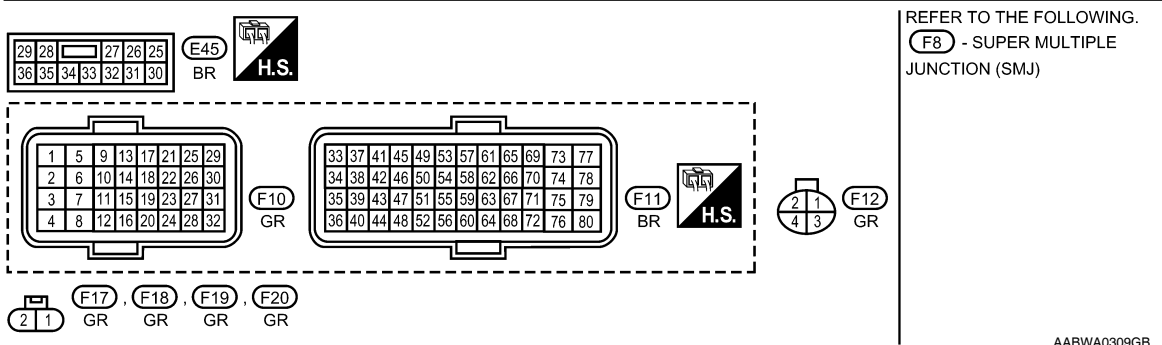
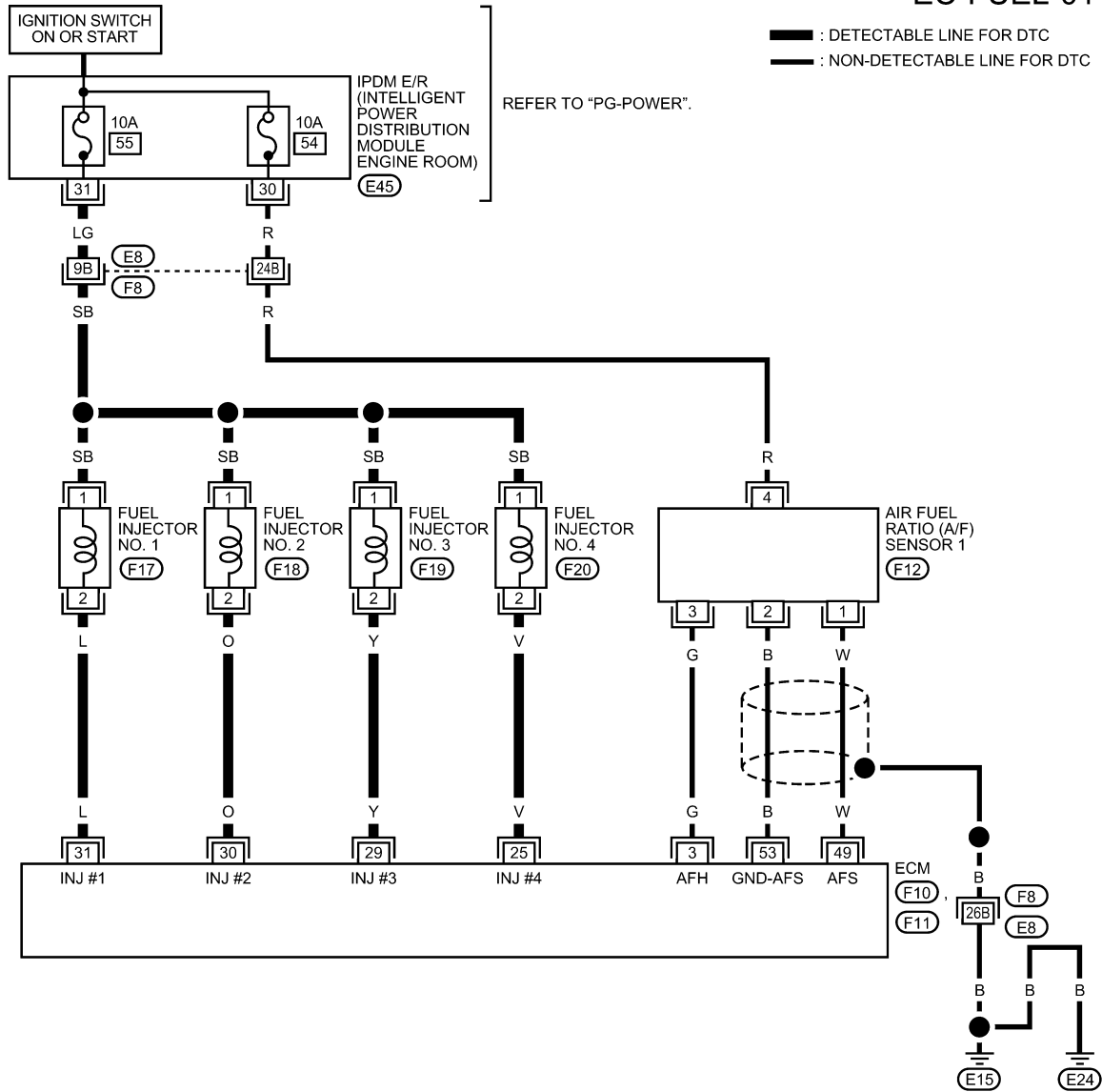
< COMPONENT DIAGNOSIS >

[HR16DE]

INFOID:000000005398399

Wiring Diagram

EC-FUEL-01



Diagnosis Procedure

INFOID:000000005398400

1. CHECK EXHAUST GAS LEAK

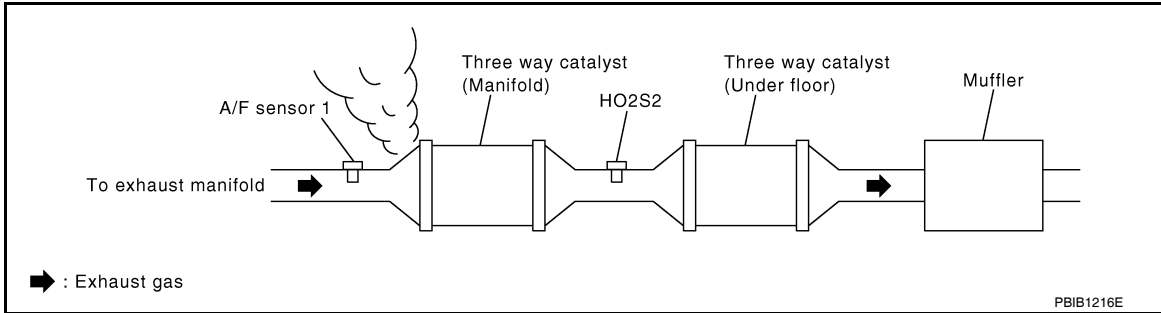
1. Start engine and run it at idle.

P0172 FUEL INJECTION SYSTEM FUNCTION

[HR16DE]

< COMPONENT DIAGNOSIS >

- Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

- YES >> Repair or replace.
- NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

- YES >> Repair or replace.
- NO >> GO TO 3.

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

- Turn ignition switch OFF.
- Disconnect corresponding A/F sensor 1 harness connector.
- Disconnect ECM harness connector.
- Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

- Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

- Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL PRESSURE

- Check fuel pressure. Refer to [EC-496. "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> GO TO 5.

P0172 FUEL INJECTION SYSTEM FUNCTION

[HR16DE]

< COMPONENT DIAGNOSIS >

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

- YES >> Replace "fuel filter and fuel pump assembly".
- NO >> Repair or replace

6. CHECK MASS AIR FLOW SENSOR

 **With CONSULT-III**

1. Install all removed parts.
2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III.
3. For specification, refer to [EC-502, "Mass Air Flow Sensor"](#).

 **With GST**

1. Install all removed parts.
2. Check mass air flow sensor signal in "Service \$01" with GST.
3. For specification, refer to [EC-502, "Mass Air Flow Sensor"](#).

Is the measurement value within the specification?

- YES >> GO TO 7.
- NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to [EC-142, "DTC Logic"](#).

7. CHECK FUNCTION OF FUEL INJECTOR

 **With CONSULT-III**

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

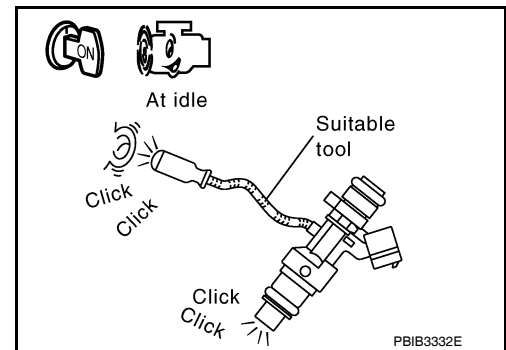
 **Without CONSULT-III**

1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC-423, "Component Function Check"](#).



8. CHECK FUEL INJECTOR

1. Remove fuel injector assembly. Refer to [EM-34, "Removal and Installation"](#).
Keep fuel hose and all fuel injectors connected to fuel tube.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each fuel injectors.
6. Crank engine for about 3 seconds.
Make sure fuel does not drip from fuel injector.

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one.

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

P0181 FTT SENSOR

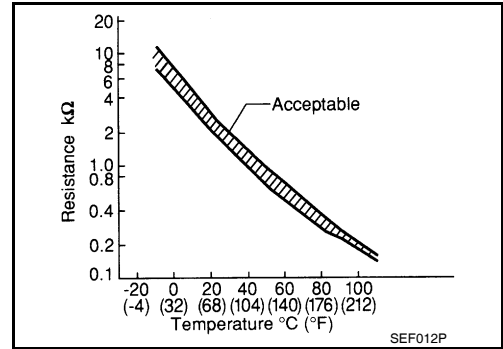
Description

INFOID:000000005398401

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Fluid temperature [°C (°F)]	Voltage* [V]	Resistance [kΩ]
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90



*: These data are reference values and are measured between ECM terminal 43 (Fuel tank temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC Logic

INFOID:000000005398402

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0181	Fuel tank temperature sensor circuit range/performance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted) • Fuel tank temperature sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Turn ignition switch and wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-236, "Diagnosis Procedure"](#).
- NO >> GO TO 3.

3. CHECK ENGINE COOLANT TEMPERATURE

With CONSULT-III

1. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III.
2. Check "COOLAN TEMP/S" indication.

With GST

Follow the procedure "With CONSULT-III" above.

Is "COOLAN TEMP/S" indication less than 60°C (140°F)?

- YES >> INSPECTION END
- NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

P0181 FTT SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

With CONSULT-III

1. Cool engine down until "COOLAN TEMP/S" indication is less than 60°C (140°F).
2. Wait at least 10 seconds.
3. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

- YES >> Go to [EC-236. "Diagnosis Procedure"](#).
NO >> INSPECTION END

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

P0181 FTT SENSOR

< COMPONENT DIAGNOSIS >

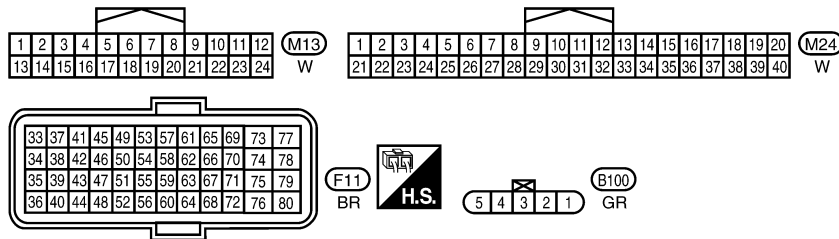
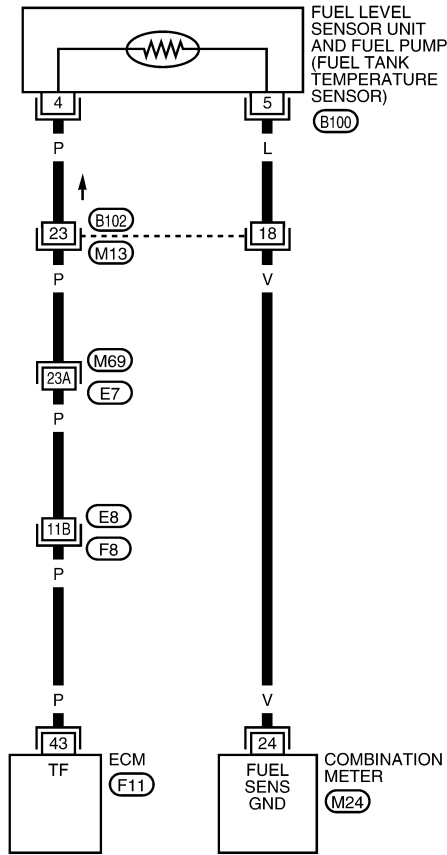
[HR16DE]

Wiring Diagram

INFOID:000000005398403

EC-FTTS-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
 (M69), (F8) - SUPER
 MULTIPLE JUNCTION (SMJ)

BBWA2636E

Diagnosis Procedure

INFOID:000000005398404

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

P0181 FTT SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
NO >> Repair or replace ground connection.

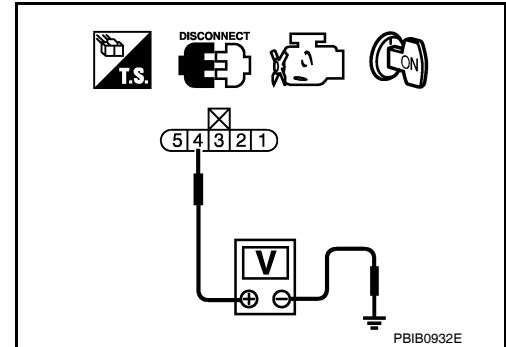
2.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
3. Turn ignition switch ON.
4. Check the voltage between "fuel level sensor unit and fuel pump" harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage
Connector	Terminal		
B100	4	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B102, M13
- Harness connectors M69, E7
- Harness connectors E8, F8
- Harness for open or short between ECM and "fuel level sensor unit and fuel pump"

>> Repair open circuit or short to ground or short to power in harness or connector.

4.CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect combination meter harness connector.
3. Check the continuity between "fuel level sensor unit and fuel pump" harness connector and combination meter harness connector.

Fuel level sensor unit and fuel pump		Combination meter		Continuity
Connector	Terminal	Connector	Terminal	
B100	5	M24	24	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B102, M13
- Harness for open or short between "fuel level sensor unit and fuel pump" and combination meter

>> Repair open circuit or short to ground or short to power in harness or connector.

6.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to [EC-238. "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 7.
NO >> Replace "fuel level sensor unit and fuel pump".

7.CHECK INTERMITTENT INCIDENT

Refer to [EC-114. "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398405

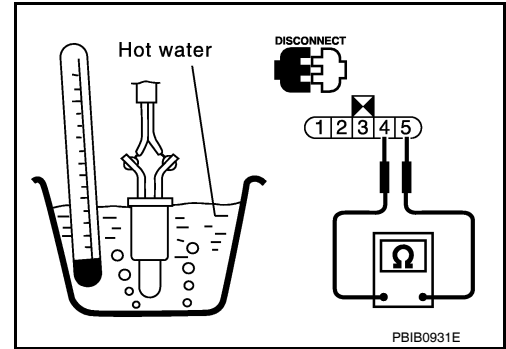
1. CHECK FUEL TANK TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
3. Remove fuel level sensor unit.
4. Check resistance between "fuel level sensor unit and fuel pump" terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance
4 and 5	Temperature [°C (°F)]	20 (68)	2.3 - 2.7 kΩ
		50 (122)	0.79 - 0.90 kΩ

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Replace "fuel level sensor unit and fuel pump".



P0182, P0183 FTT SENSOR

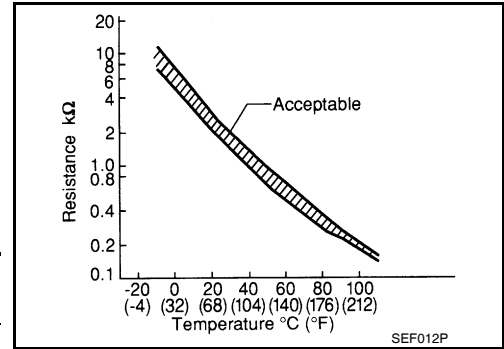
Description

INFOID:000000005398406

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Fluid temperature [°C (°F)]	Voltage* [V]	Resistance [kΩ]
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90



*: These data are reference values and are measured between ECM terminal 43 (Fuel tank temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC Logic

INFOID:000000005398407

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182	Fuel tank temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted.) • Fuel tank temperature sensor
P0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-240, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

P0182, P0183 FTT SENSOR

< COMPONENT DIAGNOSIS >

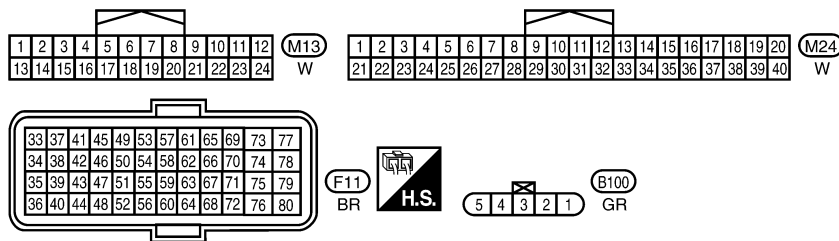
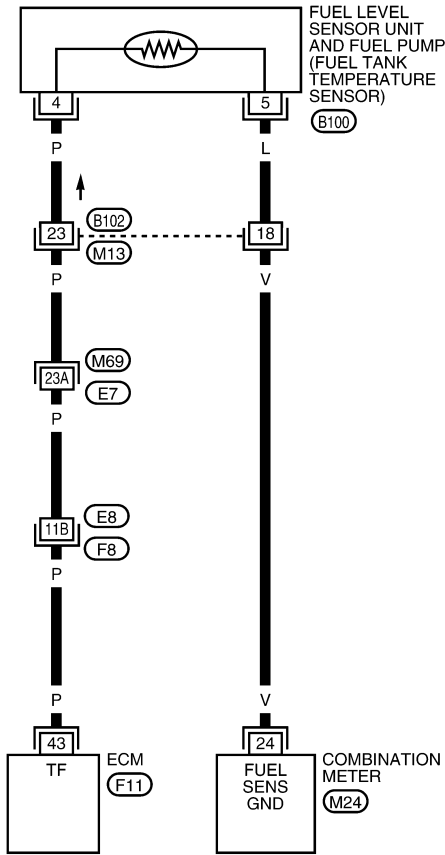
[HR16DE]

Wiring Diagram

INFOID:000000005398408

EC-FTTS-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
 (M69), (F8) - SUPER
 MULTIPLE JUNCTION (SMJ)

BBWA2636E

Diagnosis Procedure

INFOID:000000005398409

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

P0182, P0183 FTT SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
 NO >> Repair or replace ground connection.

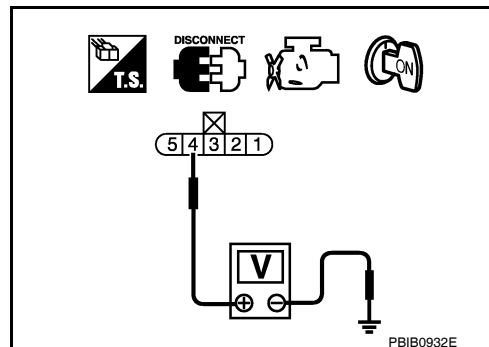
2.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
3. Turn ignition switch ON.
4. Check the voltage between "fuel level sensor unit and fuel pump" harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage
Connector	Terminal		
B100	4	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B102, M13
- Harness connectors M69, E7
- Harness connectors E8, F8
- Harness for open or short between ECM and "fuel level sensor unit and fuel pump"

>> Repair open circuit or short to ground or short to power in harness or connector.

4.CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect combination meter harness connector.
3. Check the continuity between "fuel level sensor unit and fuel pump" harness connector and combination meter harness connector.

Fuel level sensor unit and fuel pump		Combination meter		Continuity
Connector	Terminal	Connector	Terminal	
B100	5	M24	24	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 6.
 NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B102, M13
- Harness for open or short between "fuel level sensor unit and fuel pump" and combination meter

>> Repair open circuit or short to ground or short to power in harness or connector.

6.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to [EC-242. "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> Replace "fuel level sensor unit and fuel pump".

7.CHECK INTERMITTENT INCIDENT

Refer to [EC-114. "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398410

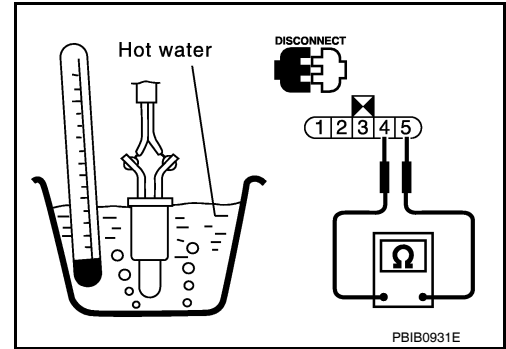
1. CHECK FUEL TANK TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
3. Remove fuel level sensor unit.
4. Check resistance between "fuel level sensor unit and fuel pump" terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance
4 and 5	Temperature [°C (°F)]	20 (68)	2.3 - 2.7 kΩ
		50 (122)	0.79 - 0.90 kΩ

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Replace "fuel level sensor unit and fuel pump".



P0222, P0223 TP SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

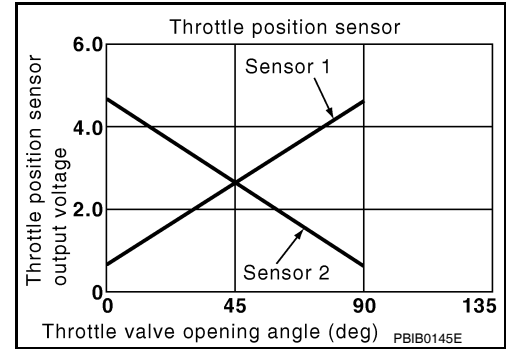
P0222, P0223 TP SENSOR

Description

INFOID:000000005398411

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic

INFOID:000000005398412

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	<ul style="list-style-type: none"> Harness or connectors (TP sensor 1 circuit is open or shorted.)
P0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	<ul style="list-style-type: none"> Electric throttle control actuator (TP sensor 1)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Go to [EC-244, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

P0222, P0223 TP SENSOR

< COMPONENT DIAGNOSIS >

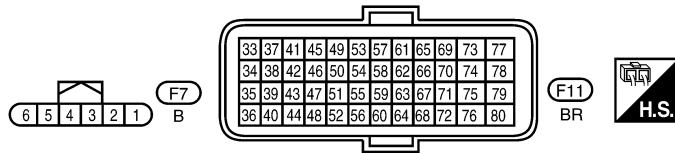
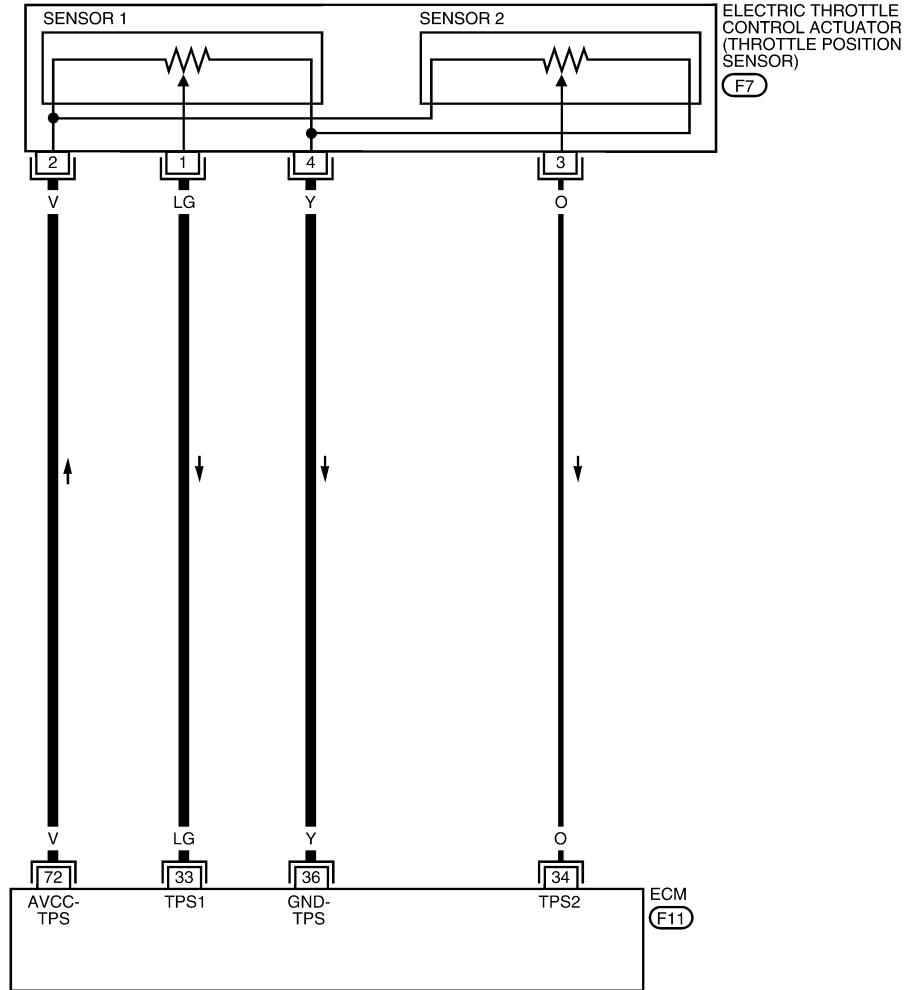
[HR16DE]

Wiring Diagram

INFOID:000000005398413

EC-TPS1-01

: DETECTABLE LINE FOR DTC
 : NON-DETECTABLE LINE FOR DTC



BBWA2655E

Diagnosis Procedure

INFOID:000000005398414

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

P0222, P0223 TP SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
 NO >> Repair or replace ground connection.

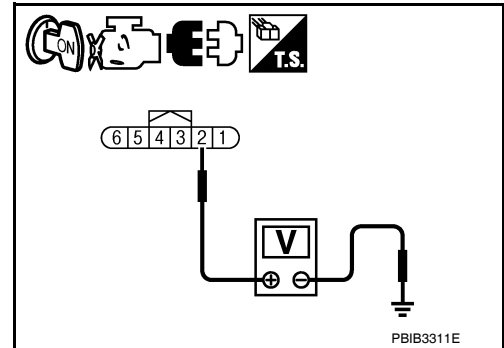
2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.
3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F7	2	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.



3.CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	4	F11	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	1	F11	33	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to [EC-246. "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform [EC-246. "Special Repair Requirement"](#).

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-114. "Diagnosis Procedure"](#).

>> INSPECTION END

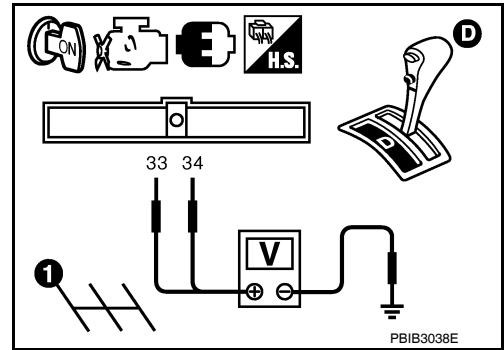
Component Inspection

INFOID:000000005398415

1. CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform [EC-25. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).
4. Turn ignition switch ON.
5. Set selector lever to D (A/T) or 1st (M/T) position.
6. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	33 (TP sensor 1 signal)	Ground	Fully released	More than 0.36V
			Fully depressed	Less than 4.75V
	34 (TP sensor 2 signal)		Fully released	Less than 4.75V
			Fully depressed	More than 0.36V



Is the inspection result normal?

- YES >> INSPECTION END
 NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform [EC-246. "Special Repair Requirement"](#).

>> INSPECTION END

Special Repair Requirement

INFOID:000000005398416

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to [EC-25. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#)

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-26. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"](#)

>> END

P0300, P0301, P0302, P0303, P0304 MISFIRE

< COMPONENT DIAGNOSIS >

[HR16DE]

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

INFOID:000000005398417

DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

- One Trip Detection Logic (Three Way Catalyst Damage)**
 On the 1st trip, when a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
 When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
 When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
 If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
 When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
 If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
- Two Trip Detection Logic (Exhaust quality deterioration)**
 For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
 A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300	Multiple cylinder misfire detected	Multiple cylinders misfire.	<ul style="list-style-type: none"> • Improper spark plug • Insufficient compression • Incorrect fuel pressure • The fuel injector circuit is open or shorted • Fuel injector • Intake air leak • The ignition signal circuit is open or shorted • Lack of fuel • Signal plate • A/F sensor 1 • Incorrect PCV hose connection
P0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for about 15 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to [EC-248, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Turn ignition switch OFF and wait at least 10 seconds.

P0300, P0301, P0302, P0303, P0304 MISFIRE

[HR16DE]

< COMPONENT DIAGNOSIS >

2. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.

Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

Engine speed	Engine speed in the freeze frame data \pm 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data \pm 10 km/h (6 MPH)
Base fuel schedule	Base fuel schedule in freeze frame data \times (1 \pm 0.1)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).
	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).

The time to driving varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-248. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398418

1. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
3. Check PCV hose connection.

Is intake air leak detected?

- YES >> Discover air leak location and repair.
NO >> GO TO 2.

2. CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

Is the inspection result normal?

- YES-1 >> With CONSULT-III: GO TO 3.
YES-2 >> Without CONSULT-III: GO TO 4.
NO >> Repair or replace it.

3. PERFORM POWER BALANCE TEST

With CONSULT-III

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

- YES >> GO TO 9.
NO >> GO TO 4.

4. CHECK FUNCTION OF FUEL INJECTOR

1. Start engine and let engine idle.

P0300, P0301, P0302, P0303, P0304 MISFIRE

[HR16DE]

< COMPONENT DIAGNOSIS >

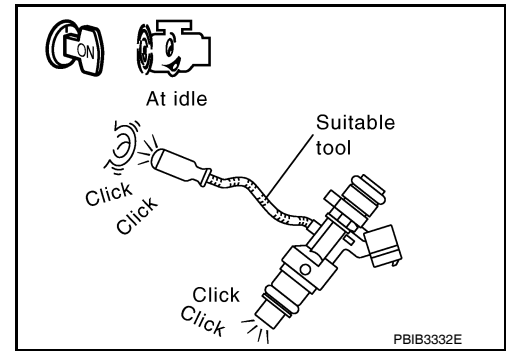
- Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC-425. "Component Inspection"](#).



5. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

- Turn ignition switch OFF.
- Remove fuel pump fuse in IPDM E/R to release fuel pressure.

NOTE:

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- Start engine.
- After engine stalls, crank it two or three times to release all fuel pressure.
- Turn ignition switch OFF.
- Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- Remove ignition coil and spark plug of the cylinder to be checked.
- Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- Connect spark plug and harness connector to ignition coil.
- Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

- During the operation, always stay 0.5 m (19.7 in) away from the spark plug and the ignition coil within. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.

NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 6.

6. CHECK FUNCTION OF IGNITION COIL-II

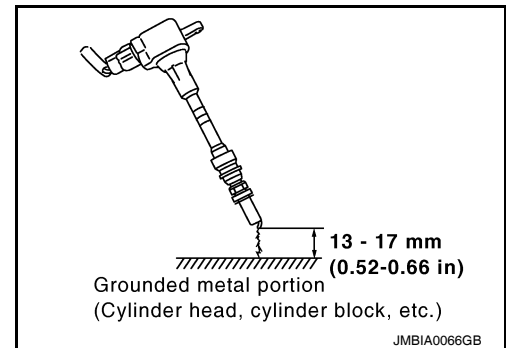
- Turn ignition switch OFF.
- Disconnect spark plug and connect a known-good spark plug.
- Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Check ignition coil, power transistor and their circuits. Refer to [EC-432. "Component Function Check"](#).

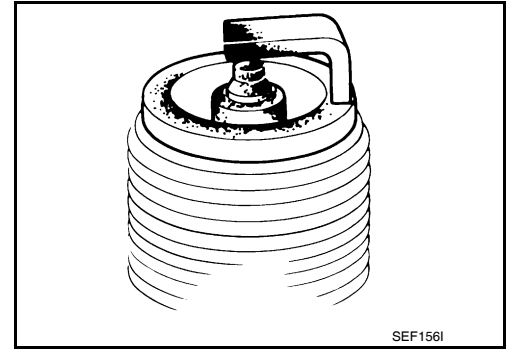


7. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-112. "Spark Plug"](#).
NO >> Repair or clean spark plug. Then GO TO 8.

**8. CHECK FUNCTION OF IGNITION COIL-III**

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-112. "Spark Plug"](#).

9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to [EM-23. "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 10.
NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Check fuel pressure. Refer to [EC-496. "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 12.
NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

- YES >> Replace "fuel filter and fuel pump assembly".
NO >> Repair or replace.

12. CHECK IGNITION TIMING

Check the following items. Refer to [EC-20. "BASIC INSPECTION : Special Repair Requirement"](#). For specification, refer to [EC-502. "Ignition Timing"](#).

Is the inspection result normal?

- YES >> GO TO 13.
NO >> Follow the [EC-20. "BASIC INSPECTION : Special Repair Requirement"](#).

13. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect corresponding A/F sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

P0300, P0301, P0302, P0303, P0304 MISFIRE

< COMPONENT DIAGNOSIS >

[HR16DE]

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 14.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

14.CHECK A/F SENSOR 1 HEATER

Refer to [EC-133, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace A/F sensor 1.

15.CHECK MASS AIR FLOW SENSOR

 **With CONSULT-III**

Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III.

For specification, refer to [EC-502, "Mass Air Flow Sensor"](#).

 **With GST**

Check mass air flow sensor signal in Service \$01 with GST.

For specification, refer to [EC-502, "Mass Air Flow Sensor"](#).

Is the measurement value within the specification?

YES >> GO TO 16.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to [EC-142, "DTC Logic"](#).

16.CHECK SYMPTOM TABLE

Check items on the rough idle symptom in [EC-484, "Symptom Table"](#).

Is the inspection result normal?

YES >> GO TO 17.

NO >> Repair or replace.

17.ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.

Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to "How to Erase DTC and 1st Trip DTC" in [EC-84, "Diagnosis Description"](#).

>> GO TO 18.

P0300, P0301, P0302, P0303, P0304 MISFIRE

< COMPONENT DIAGNOSIS >

[HR16DE]

18.CHECK INTERMITTENT INCIDENT

Refer to [EC-114. "Diagnosis Procedure"](#).

>> INSPECTION END

P0327, P0328 KS

Description

INFOID:000000005398419

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

DTC Logic

INFOID:000000005398420

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detected condition	Possible cause
P0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted.) • Knock sensor
P0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

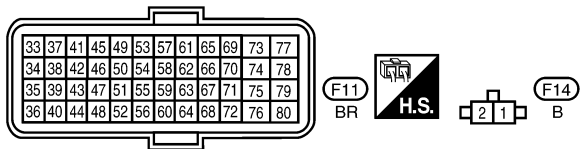
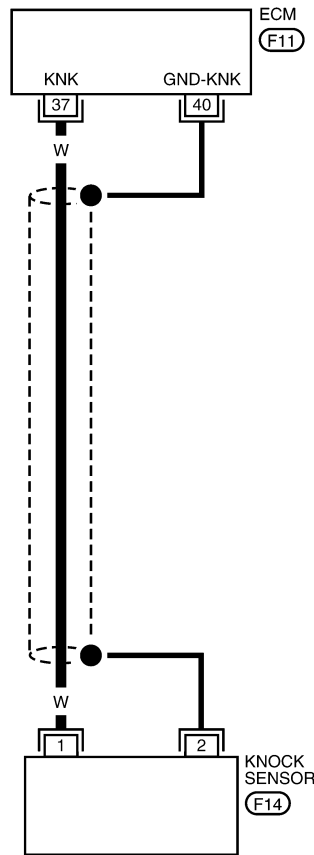
- YES >> Go to [EC-254. "Diagnosis Procedure"](#).
- NO >> INSPECTION END

Wiring Diagram

INFOID:000000005398421

EC-KS-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA2637E

Diagnosis Procedure

INFOID:000000005398422

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

2.CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect knock sensor harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F14	2	F11	40	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F14	1	F11	37	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK KNOCK SENSOR

Refer to [EC-255, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Replace knock sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398423

1.CHECK KNOCK SENSOR

1. Turn ignition switch OFF.
2. Disconnect knock sensor harness connector.
3. Check resistance between knock sensor terminals as per the following.

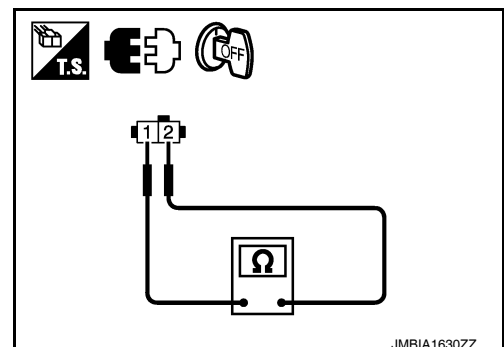
NOTE:

It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Terminals	Resistance
1 and 2	Approx. 532 - 588 kΩ [at 20°C (68°F)]

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.



< COMPONENT DIAGNOSIS >

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace knock sensor.

P0335 CKP SENSOR (POS)

< COMPONENT DIAGNOSIS >

[HR16DE]

P0335 CKP SENSOR (POS)

Description

INFOID:000000005398424

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet and Hall IC.

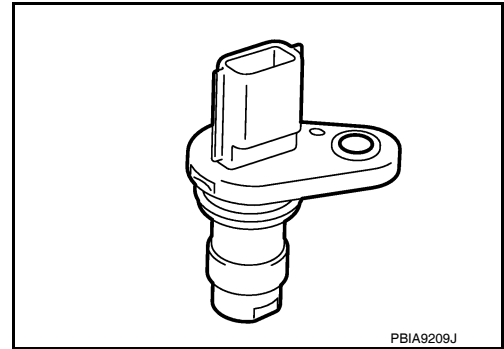
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

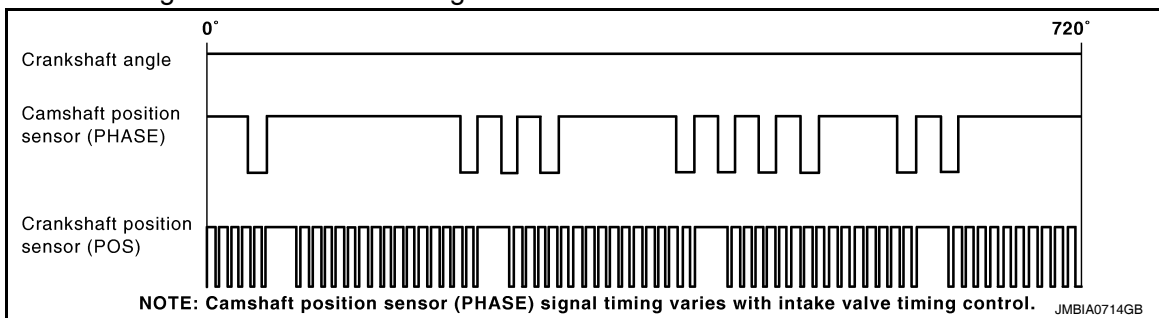
Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

ECM receives the signals as shown in the figure.



PBIA9209J



JMBIA0714GB

DTC Logic

INFOID:000000005398425

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (POS) circuit	<ul style="list-style-type: none"> The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. The crankshaft position sensor (POS) signal is not in the normal pattern during engine running. 	<ul style="list-style-type: none"> Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Refrigerant pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) Crankshaft position sensor (POS) Refrigerant pressure sensor Accelerator pedal position sensor EVAP control system pressure sensor Signal plate

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.

P0335 CKP SENSOR (POS)

[HR16DE]

< COMPONENT DIAGNOSIS >

If engine does not start, crank engine for at least 2 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to [EC-259, "Diagnosis Procedure"](#).

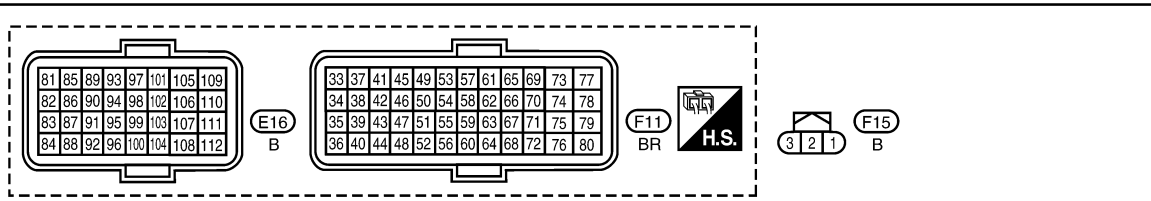
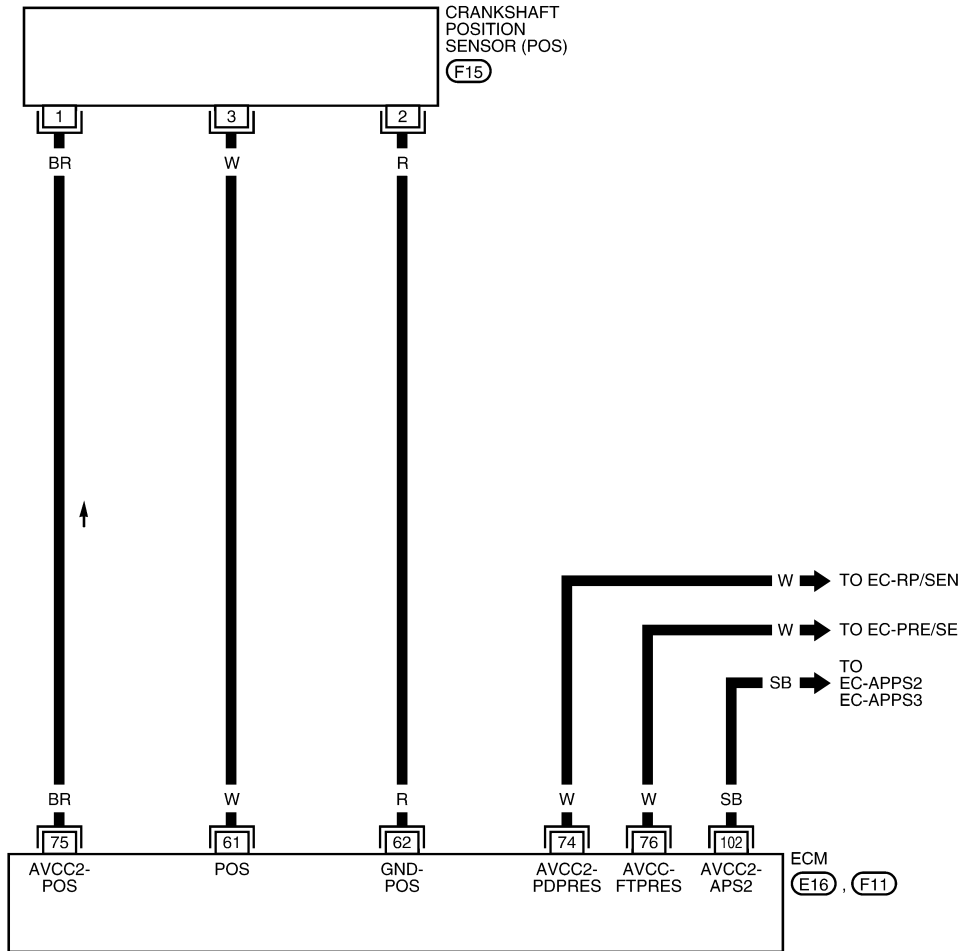
NO >> INSPECTION END

Wiring Diagram

INFOID:000000005398426

EC-POS-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA3071E

P0335 CKP SENSOR (POS)

[HR16DE]

< COMPONENT DIAGNOSIS >

INFOID:000000005398427

Diagnosis Procedure

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119. "Ground Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Repair or replace ground connection.

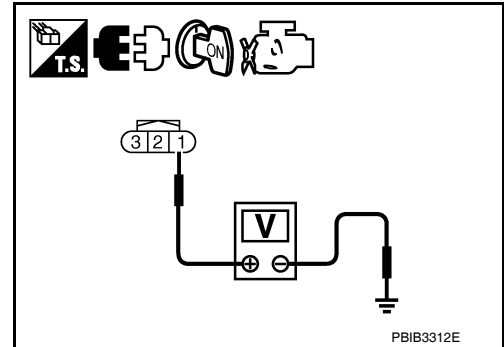
2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-I

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CKP sensor (POS) harness connector and ground.

CKP sensor (POS)		Ground	Voltage
Connector	Terminal		
F15	1	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> GO TO 8.
 NO >> GO TO 3.



3. CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT-II

1. Turn ignition switch ON.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F15	1	F11	75	Existed

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Repair open circuit.

4. CHECK CKP SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
	76	EVAP control system pressure sensor	B104	3
E16	102	APP sensor	E12	5

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Repair short to ground or short to power in harness or connectors.

5. CHECK COMPONENTS

Check the following.

- Refrigerant pressure sensor (Refer to [EC-451. "Diagnosis Procedure"](#).)
- EVAP control system pressure sensor (Refer to [EC-308. "Component Inspection"](#).)

Is the inspection result normal?

P0335 CKP SENSOR (POS)

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 6.
NO >> Replace malfunctioning components.

6. CHECK APP SENSOR

Refer to [EC-395, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 12.
NO >> GO TO 7.

7. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-395, "Special Repair Requirement"](#).

>> INSPECTION END

8. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F15	2	F11	62	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F15	3	F11	61	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 10.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to [EC-261, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 11.
NO >> Replace crankshaft position sensor (POS).

11. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

- YES >> GO TO 12.
NO >> Replace the signal plate.

12. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

P0335 CKP SENSOR (POS)

[HR16DE]

< COMPONENT DIAGNOSIS >

>> INSPECTION END

Component Inspection

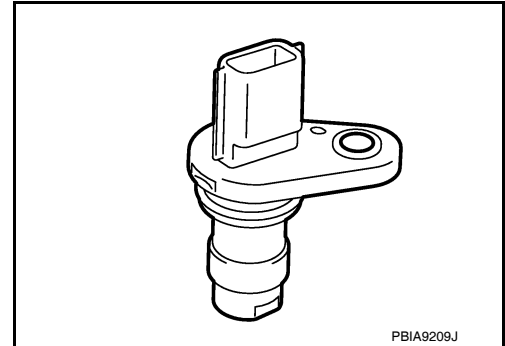
INFOID:000000005398428

1. CHECK CRANKSHAFT POSITION SENSOR (POS)-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect crankshaft position sensor (POS) harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Replace crankshaft position sensor (POS).



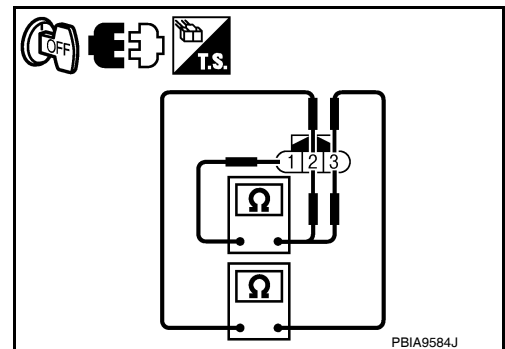
2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as per the following.

Terminals (Polarity)	Resistance [Ω at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace crankshaft position sensor (POS).



P0340 CMP SENSOR (PHASE)

< COMPONENT DIAGNOSIS >

[HR16DE]

P0340 CMP SENSOR (PHASE)

Description

INFOID:000000005398429

The camshaft position sensor (PHASE) senses the retraction of camshaft (INT) to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.

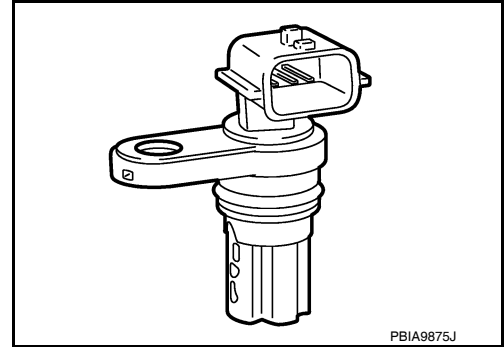
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

The sensor consists of a permanent magnet and Hall IC.

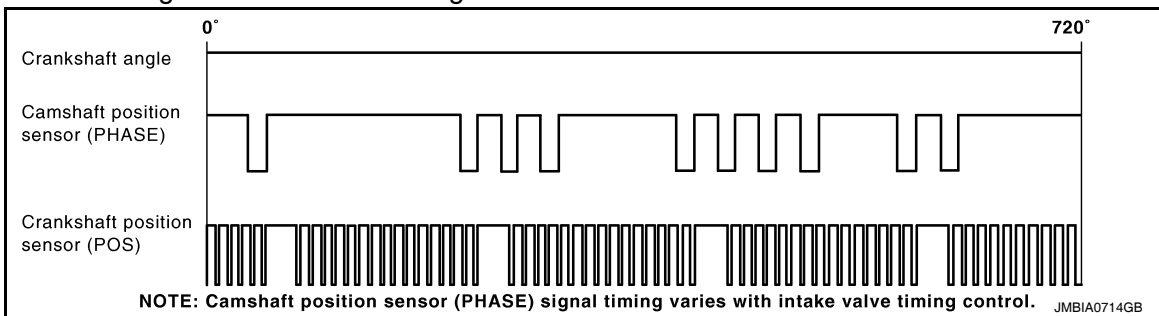
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes. ECM receives the signals as shown in the figure.



PBIA9875J



JMBIA0714GB

DTC Logic

INFOID:000000005398430

DTC DETECTION LOGIC

NOTE:

If DTC P0340 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-352, "DTC Logic"](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340	Camshaft position sensor (PHASE) circuit	<ul style="list-style-type: none"> The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. The cylinder No. signal is not sent to ECM during engine running. The cylinder No. signal is not in the normal pattern during engine running. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted) Camshaft position sensor (PHASE) Camshaft (INT) Starter motor Starting system circuit Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- Start engine and let it idle for at least 5 seconds.
If engine does not start, crank engine for at least 2 seconds.
- Check 1st trip DTC.

P0340 CMP SENSOR (PHASE)

[HR16DE]

< COMPONENT DIAGNOSIS >

Is 1st trip DTC detected?

YES >> Go to [EC-264, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to [EC-264, "Diagnosis Procedure"](#).

NO >> INSPECTION END

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

P0340 CMP SENSOR (PHASE)

< COMPONENT DIAGNOSIS >

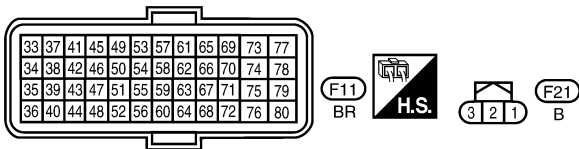
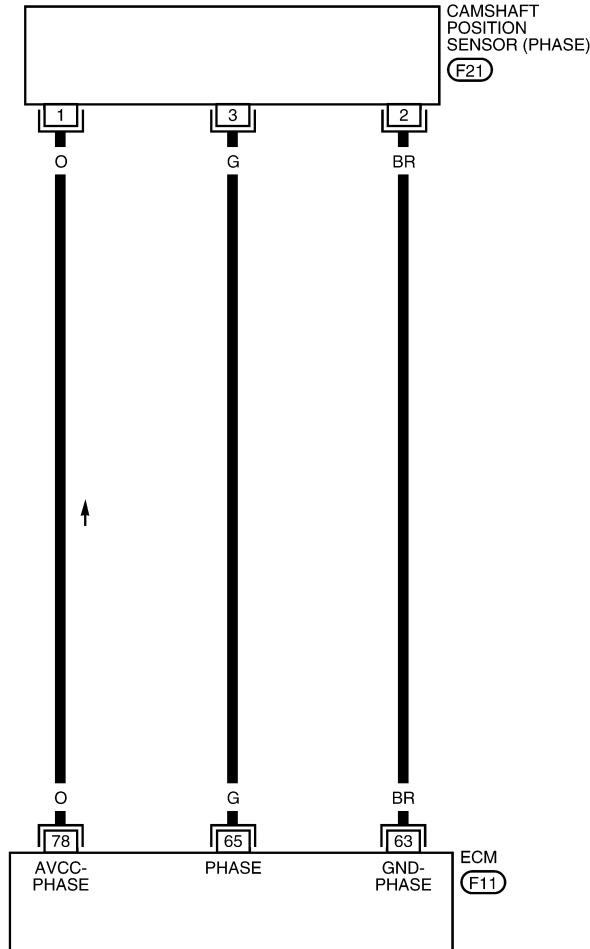
[HR16DE]

Wiring Diagram

INFOID:000000005398431

EC-PHASE-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA2639E

Diagnosis Procedure

INFOID:000000005398432

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

P0340 CMP SENSOR (PHASE)

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
 NO >> Check starting system (Refer to [SC-16, "Trouble Diagnosis with Multitasking Battery Diagnostic Station"](#)).

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Repair or replace ground connection.

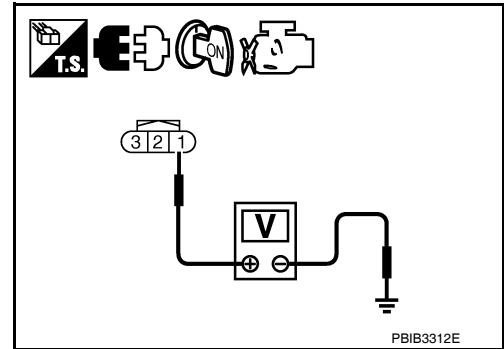
3.CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CMP sensor (PHASE) harness connector and ground.

CMP sensor (PHASE)		Ground	Voltage
Connector	Terminal		
F21	1	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.



4.CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F21	2	F11	63	Existed

3. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F21	3	F11	65	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 6.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-266, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> Replace camshaft position sensor (PHASE).

P0340 CMP SENSOR (PHASE)

[HR16DE]

< COMPONENT DIAGNOSIS >

7. CHECK CAMSHAFT (INT)

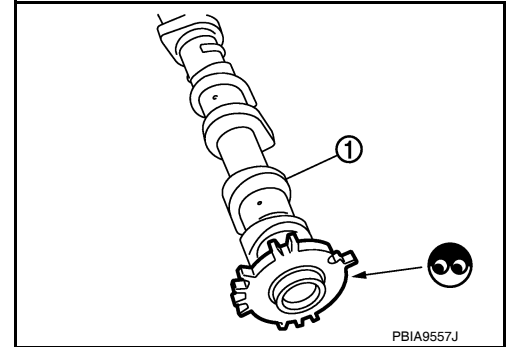
Check the following.

- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end

Is the inspection result normal?

YES >> GO TO 8.

NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



8. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398433

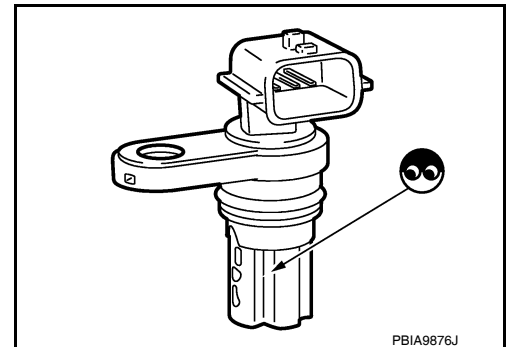
1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect camshaft position sensor (PHASE) harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace camshaft position sensor (PHASE).



2. CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

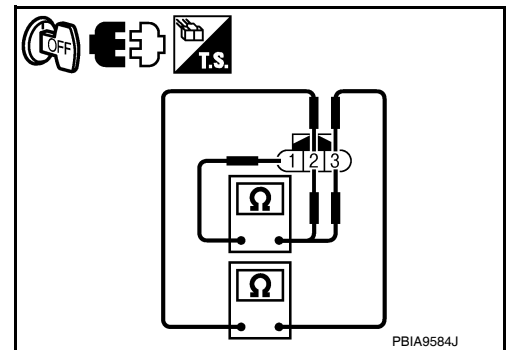
Check resistance camshaft position sensor (PHASE) terminals as per the following.

Terminals (Polarity)	Resistance [Ω at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace camshaft position sensor (PHASE).



P0420 THREE WAY CATALYST FUNCTION

< COMPONENT DIAGNOSIS >

[HR16DE]

P0420 THREE WAY CATALYST FUNCTION

DTC Logic

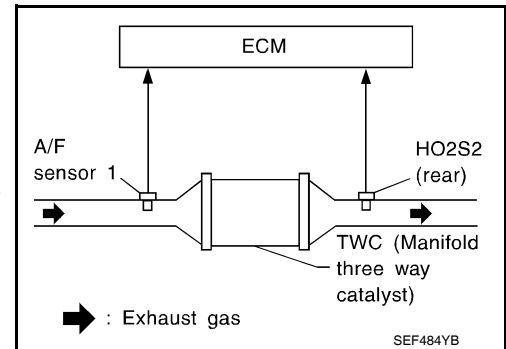
INFOID:000000005398434

DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2.

A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.

When the frequency ratio of A/F sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420	Catalyst system efficiency below threshold	<ul style="list-style-type: none"> Three way catalyst (manifold) does not operate properly. Three way catalyst (manifold) does not have enough oxygen storage capacity. 	<ul style="list-style-type: none"> Three way catalyst (manifold) Exhaust tube Intake air leaks Fuel injector Fuel injector leaks Spark plug Improper ignition timing

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 7.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Do not hold engine speed for more than the specified minutes below.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

Ⓜ With CONSULT-III

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- Make sure that "COOLAN TEMP/S" indication is more than 70°C (158°F).
If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
- Open engine hood.
- Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-III.
- Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
- Check the indication of "CATALYST".

Which is displayed on CONSULT-III screen?

P0420 THREE WAY CATALYST FUNCTION

[HR16DE]

< COMPONENT DIAGNOSIS >

- CMPLT >> GO TO 6.
- INCMP >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Wait 5 seconds at idle.
2. Rev engine up to 2,000 to 3,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take approximately 5 minutes).

Does the indication change to "CMPLT"?

- YES >> GO TO 6.
- NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Stop engine and cool it down to less than 70°C (158°F).
2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

6. PERFORM DTC CONFIRMATION PROCEDURE-III

Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-269. "Diagnosis Procedure"](#).
- NO >> INSPECTION END

7. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to [EC-268. "Component Function Check"](#).

NOTE:

Use component function check to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to [EC-269. "Diagnosis Procedure"](#).

Component Function Check

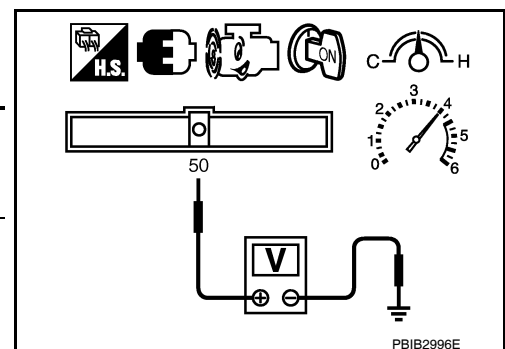
INFOID:000000005398435

1. PERFORM COMPONENT FUNCTION CHECK

⊗ Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Con- nector	Terminal			
F11	50 (HO2S2 signal)	Ground	Keeping engine speed at 2,500 rpm constant under no load	The voltage fluctuation cycle takes more than 5 seconds. 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0



Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to [EC-269. "Diagnosis Procedure"](#).

P0420 THREE WAY CATALYST FUNCTION

[HR16DE]

< COMPONENT DIAGNOSIS >

INFOID:000000005398436

Diagnosis Procedure

1. CHECK EXHAUST SYSTEM

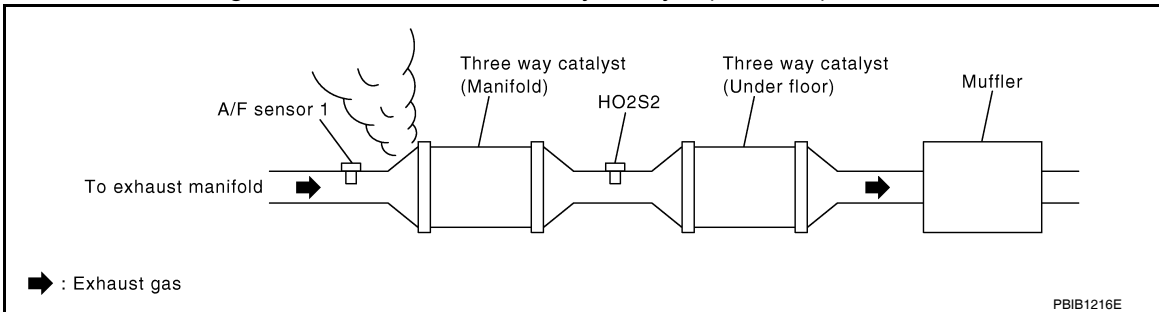
Visually check exhaust tubes and muffler for dent.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace.

2. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).



Is exhaust gas leak detected?

- YES >> Repair or replace.
- NO >> GO TO 3.

3. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

- YES >> Repair or replace.
- NO >> GO TO 4.

4. CHECK IDLE SPEED AND IGNITION TIMING

For procedure, refer to [EC-24, "IGNITION TIMING : Special Repair Requirement"](#).

For specification, refer to [EC-502, "Idle Speed"](#) and [EC-502, "Ignition Timing"](#).

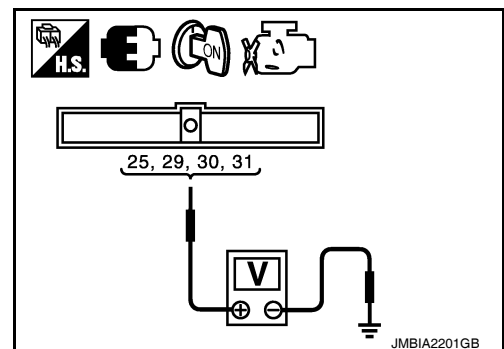
Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Follow the instruction of [EC-20, "BASIC INSPECTION : Special Repair Requirement"](#).

5. CHECK FUEL INJECTOR

1. Stop engine and then turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F10	25	Ground	Battery voltage
	29		
	30		
	31		



Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Perform [EC-424, "Diagnosis Procedure"](#).

6. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

P0420 THREE WAY CATALYST FUNCTION

[HR16DE]

< COMPONENT DIAGNOSIS >

Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
NOTE:
Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

- During the operation, always stay 0.5 m (19.7 in) away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.

NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

- YES >> GO TO 10.
NO >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

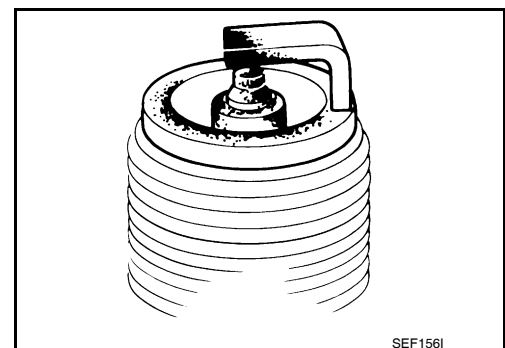
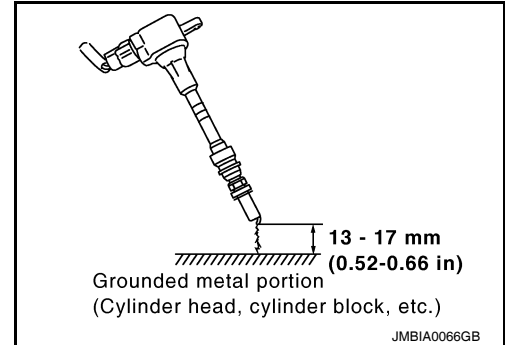
- YES >> GO TO 8.
NO >> Check ignition coil, power transistor and their circuits. Refer to [EC-434. "Diagnosis Procedure"](#).

8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-112. "Spark Plug"](#).
NO >> Repair or clean spark plug. Then GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

P0420 THREE WAY CATALYST FUNCTION

[HR16DE]

< COMPONENT DIAGNOSIS >

1. Reconnect the initial spark plugs.
2. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-112, "Spark Plug"](#).

10.CHECK FUEL INJECTOR

1. Turn ignition switch OFF. Refer to [EM-34, "Removal and Installation"](#).
2. Remove fuel injector assembly.
Keep fuel hose and all fuel injectors connected to fuel tube.
3. Disconnect all ignition coil harness connectors.
4. Reconnect all fuel injector harness connectors disconnected.
5. Turn ignition switch ON.

Does fuel drip from fuel injector?

YES >> GO TO 11.

NO >> Replace the fuel injector(s) from which fuel is dripping.

11.CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Replace three way catalyst assembly.

NO >> Repair or replace harness or connector

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

P0441 EVAP CONTROL SYSTEM

< COMPONENT DIAGNOSIS >

[HR16DE]

P0441 EVAP CONTROL SYSTEM

DTC Logic

INFOID:000000005398437

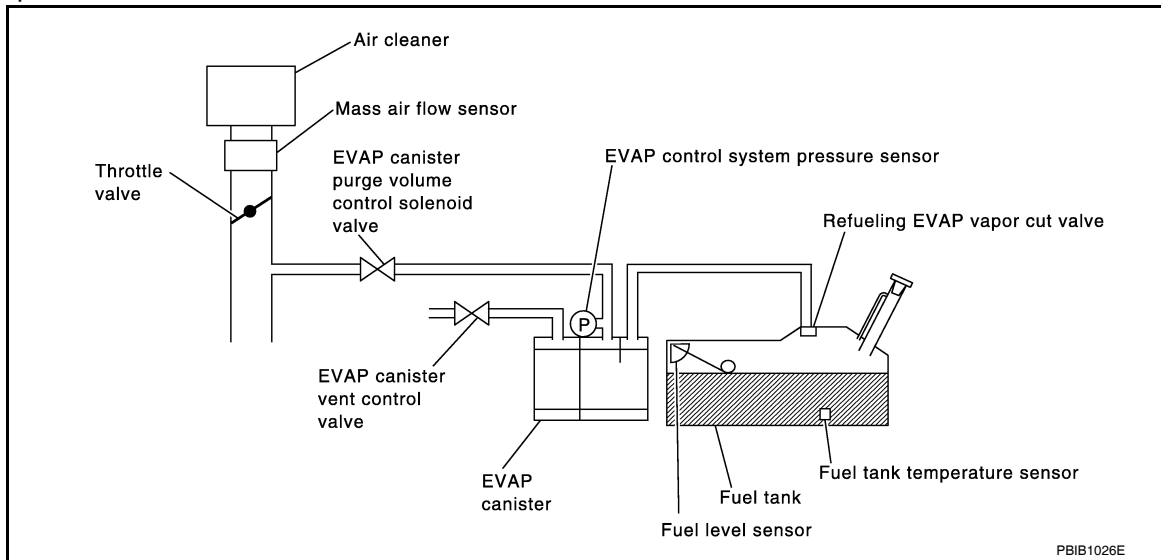
DTC DETECTION LOGIC

NOTE:

If DTC P0441 is displayed with other DTC such as P2122, P2123, P2127, P2128 or P2138, first perform trouble diagnosis for other DTC.

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0441	EVAP control system incorrect purge flow	EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	<ul style="list-style-type: none"> • EVAP canister purge volume control solenoid valve stuck closed • EVAP control system pressure sensor and the circuit • Loose, disconnected or improper connection of rubber tube • Blocked rubber tube • Cracked EVAP canister • EVAP canister purge volume control solenoid valve circuit • Accelerator pedal position sensor • Blocked purge port • EVAP canister vent control valve • Drain filter

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 6.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

P0441 EVAP CONTROL SYSTEM

< COMPONENT DIAGNOSIS >

[HR16DE]

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 70 seconds.
4. Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
5. Touch "START".

Is COMPLETED displayed on CONSULT-III screen?

YES >> GO TO 5.

NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

When the following conditions are met, "TESTING" will be displayed on the CONSULT-III screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Selector lever	Suitable position
VHCL SPEED SE	32 - 120 km/h (20 - 75 mph)
ENG SPEED	500 - 3,800 rpm
B/FUEL SCHDL	1.0 - 10.0 msec
COOLAN TEMP/S	More than 0°C (32°F)

CAUTION:

Always drive vehicle at a safe speed.

If "TESTING" is not changed for a long time, retry from step 2.

Is "COMPLETED" displayed on CONSULT-III screen?

YES >> GO TO 5.

NO >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 3.

5.PERFORM DTC CONFIRMATION PROCEDURE-II

Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END

NG >> Go to [EC-274, "Diagnosis Procedure"](#).

6.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to [EC-273, "Component Function Check"](#).

NOTE:

Use component function check to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to [EC-274, "Diagnosis Procedure"](#).

Component Function Check

INFOID:000000005398438

1.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

1. Lift up drive wheels.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and wait at least 70 seconds.

P0441 EVAP CONTROL SYSTEM

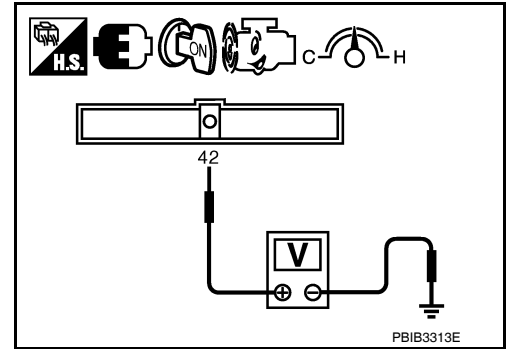
[HR16DE]

< COMPONENT DIAGNOSIS >

5. Set voltmeter probes to ECM harness connector and ground.

ECM		Ground
Connector	Terminal	
F11	42 (EVAP control system pressure sensor signal)	Ground

6. Check EVAP control system pressure sensor value at idle speed and note it.
 7. Establish and maintain the following conditions for at least 1 minute.



Air conditioner switch	ON
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Selector lever	Any position other than P, N or R

8. Verify that EVAP control system pressure sensor value stays 0.1 V less than the value at idle speed (measured at step 6 for at least 1 second).

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Go to [EC-274, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005398439

1. CHECK EVAP CANISTER

- Turn ignition switch OFF.
- Check EVAP canister for cracks.

Is the inspection result normal?

- YES-1 >> With CONSULT-III: GO TO 2.
 YES-2 >> Without CONSULT-III: GO TO 3.
 NO >> Replace EVAP canister.

2. CHECK PURGE FLOW

Ⓜ With CONSULT-III

- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to [EC-68, "System Description"](#).
- Start engine and let it idle.
- Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III.
- Rev engine up to 2,000 rpm.
- Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG VOL C/V" opening and check vacuum existence.

PURG VOL C/V	Vacuum
100%	Existed
0%	Not existed

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> GO TO 4.

3. CHECK PURGE FLOW

Ⓧ Without CONSULT-III

- Start engine and warm it up to normal operating temperature.
- Stop engine.

P0441 EVAP CONTROL SYSTEM

[HR16DE]

< COMPONENT DIAGNOSIS >

3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to [EC-68, "System Description"](#).
4. Start engine and let it idle.
Do not depress accelerator pedal even slightly.
5. Check vacuum gauge indication before 60 seconds passed after starting engine.

Vacuum should not exist.

6. Revving engine up to 2,000rpm after 100 seconds passed after starting engine.

Vacuum should exist.

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> GO TO 4.

4.CHECK EVAP PURGE LINE

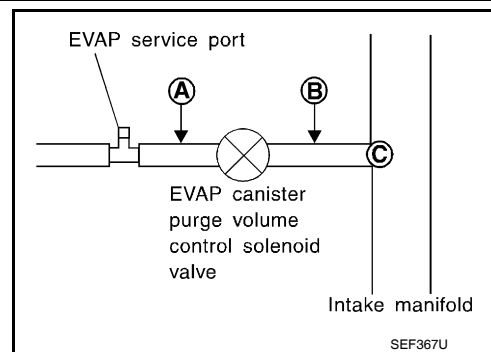
1. Turn ignition switch OFF.
2. Check EVAP purge line for improper connection or disconnection.
Refer to [EC-68, "System Description"](#).

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair it.

5.CHECK EVAP PURGE HOSE AND PURGE PORT

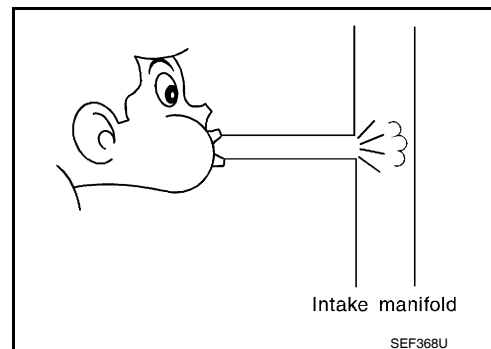
1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.
2. Blow air into each hose and EVAP purge port **C**.



3. Check that air flows freely.

Is the inspection result normal?

- YES-1 >> With CONSULT-III: GO TO 6.
- YES-2 >> Without CONSULT-III: GO TO 7.
- NO >> Repair or clean hoses and/or purge port.



6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Ⓜ With CONSULT-III

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

P0441 EVAP CONTROL SYSTEM

< COMPONENT DIAGNOSIS >

[HR16DE]

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-290, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP canister purge volume control solenoid valve.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.

2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP control system pressure sensor.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to [EC-309, "DTC Logic"](#) for DTC P0452, [EC-316, "DTC Logic"](#) for DTC P0453.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace EVAP control system pressure sensor.

10. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.

2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Clean the rubber tube using an air blower.

11. CHECK DRAIN FILTER

Refer to [EC-277, "Component Inspection \(Drain filter\)"](#).

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace drain filter.

12. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-298, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace EVAP canister vent control valve.

13. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.

Refer to [EC-498, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace it.

14. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 15.

15. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

P0441 EVAP CONTROL SYSTEM

< COMPONENT DIAGNOSIS >

[HR16DE]

>> INSPECTION END

Component Inspection (Drain filter)

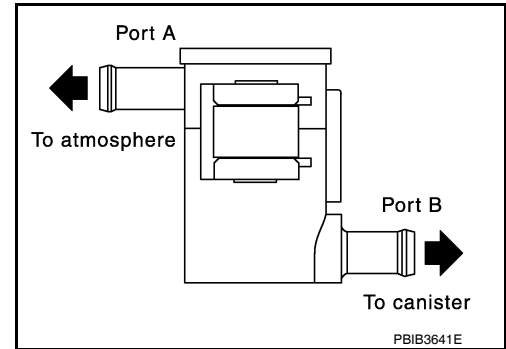
INFOID:000000005398440

1. CHECK DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace drain filter.



A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

P0442 EVAP CONTROL SYSTEM

< COMPONENT DIAGNOSIS >

[HR16DE]

P0442 EVAP CONTROL SYSTEM

DTC Logic

INFOID:000000005398441

DTC DETECTION LOGIC

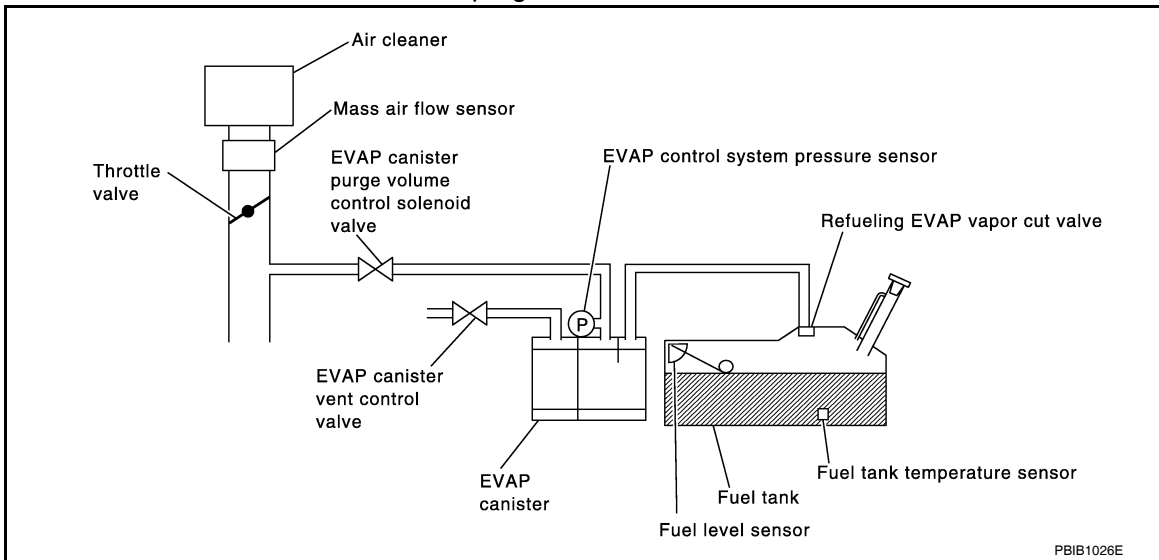
NOTE:

If DTC P0442 is displayed with DTC P0456, first perform the trouble diagnosis for DTC P0456. Refer to [EC-329, "DTC Logic"](#).

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.

If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following "Vacuum test" conditions.

The EVAP canister vent control valve is closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve will then be opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0442	EVAP control system small leak detected (negative pressure)	EVAP control system has a leak, EVAP control system does not operate properly.	<ul style="list-style-type: none"> • Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Fuel tank temperature sensor • O-ring of EVAP canister vent control valve is missing or damaged • EVAP canister is saturated with water • EVAP control system pressure sensor • Fuel level sensor and the circuit • Refueling EVAP vapor cut valve • ORVR system leaks • Drain filter

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

P0442 EVAP CONTROL SYSTEM

< COMPONENT DIAGNOSIS >

[HR16DE]

- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Always perform test at a temperature of 0 to 30°C (32 to 86°F).

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 3.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
4. Make sure that the following conditions are met.
COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
INT/A TEMP SE: 0 - 30°C (32 - 86°F)
5. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.

Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to [EC-20, "BASIC INSPECTION : Special Repair Requirement"](#).

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END

NG >> Go to [EC-279, "Diagnosis Procedure"](#).

3. PERFORM COMPONENT FUNCTION CHECK

With GST

NOTE:

Be sure to read the explanation of DRIVING PATTERN in [EC-471, "How to Set SRT Code"](#) before driving vehicle.

1. Start engine.
2. Drive vehicle according to DRIVING PATTERN.
3. Stop vehicle.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Select Service \$07 with GST.

Is 1st trip DTC displayed?

YES-1 >> P0441: Go to [EC-274, "Diagnosis Procedure"](#).

YES-2 >> P0442: Go to [EC-279, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398442

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.

P0442 EVAP CONTROL SYSTEM

[HR16DE]

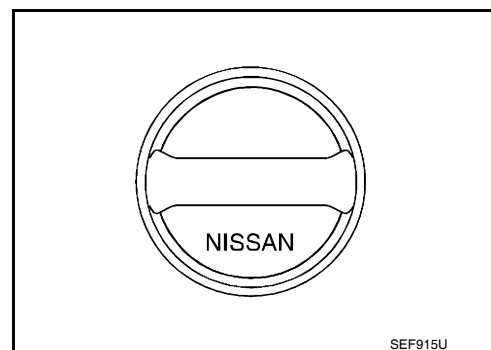
< COMPONENT DIAGNOSIS >

2. Check for genuine NISSAN fuel filler cap design.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Then retighten until ratcheting sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to [EC-283, "Component Inspection \(Fuel filler cap\)"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel filler cap with a genuine one.

5. CHECK FOR EVAP LEAK

Refer to [EC-498, "Inspection"](#).

Is there any leak in EVAP line?

YES >> Repair or replace.

NO >> GO TO 6.

6. CHECK DRAIN FILTER

Refer to [EC-283, "Component Inspection \(Drain filter\)"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace drain filter.

7. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly.

Refer to [EC-500, "Exploded View"](#).

- EVAP canister vent control valve.

Refer to [EC-298, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace EVAP canister vent control valve and O-ring.

8. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

P0442 EVAP CONTROL SYSTEM

[HR16DE]

< COMPONENT DIAGNOSIS >

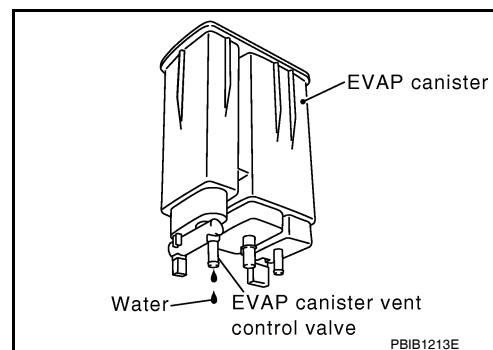
2. Does water drain from the EVAP canister?

Does water drain from the EVAP canister?

YES >> GO TO 9.

NO-1 >> With CONSULT-III: GO TO 11.

NO-2 >> Without CONSULT-III: GO TO 12.



9. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 11.

YES-2 >> Without CONSULT-III: GO TO 12.

NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-III screen to increase "PURG VOL C/V" opening to 100%.
5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 13.

12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 13.

13. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to [EC-68. "System Description"](#).

Is the inspection result normal?

P0442 EVAP CONTROL SYSTEM

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 14.
NO >> Repair or reconnect the hose.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-290, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 15.
NO >> Replace EVAP canister purge volume control solenoid valve.

15. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to [EC-238, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 16.
NO >> Replace fuel level sensor unit.

16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-306, "DTC Logic"](#).

Is the inspection result normal?

- YES >> GO TO 17.
NO >> Replace EVAP control system pressure sensor.

17. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.

Refer to [EC-68, "System Description"](#).

Is the inspection result normal?

- YES >> GO TO 18.
NO >> Repair or reconnect the hose.

18. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 19.

19. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to [EC-443, "Description"](#).

Is the inspection result normal?

- YES >> GO TO 20.
NO >> Repair or replace hoses and tubes.

20. CHECK RECIRCULATION LINE

Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

Is the inspection result normal?

- YES >> GO TO 21.
NO >> Repair or replace hose, tube or fuel filler tube.

21. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to [EC-446, "Component Inspection \(Refueling EVAP vapor cut valve\)"](#).

Is the inspection result normal?

- YES >> GO TO 22.
NO >> Replace refueling EVAP vapor cut valve with fuel tank.

22. CHECK FUEL LEVEL SENSOR

Refer to [DI-17, "Fuel Level Sensor Signal Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 23.

P0442 EVAP CONTROL SYSTEM

[HR16DE]

< COMPONENT DIAGNOSIS >

NO >> Replace fuel level sensor unit.

23.CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

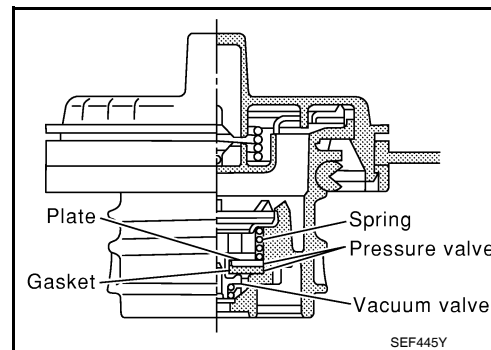
>> INSPECTION END

Component Inspection (Fuel filler cap)

INFOID:000000005398443

1.CHECK FUEL FILLER CAP

1. Turn ignition switch OFF.
2. Remove fuel filler cap.
3. Wipe clean valve housing.



4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.
5. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE FUEL FILLER CAP

Replace fuel filler cap.

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.

>> INSPECTION END

Component Inspection (Drain filter)

INFOID:000000005398444

1.CHECK DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.

P0442 EVAP CONTROL SYSTEM

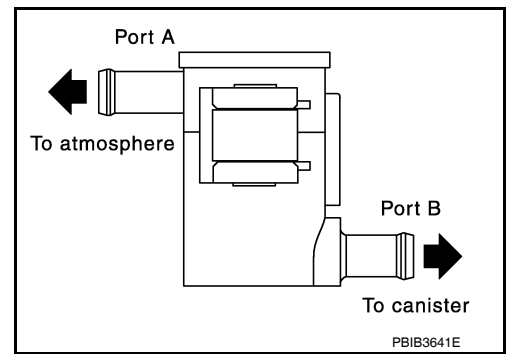
[HR16DE]

< COMPONENT DIAGNOSIS >

4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace drain filter.



P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

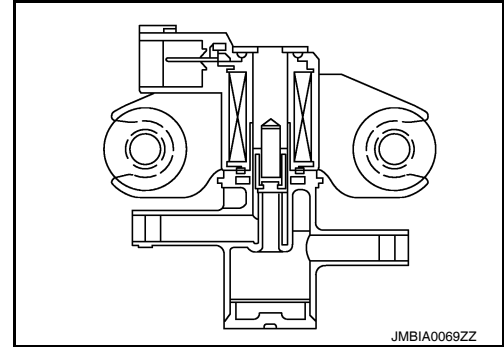
[HR16DE]

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:000000005398445

The EVAP canister purge volume control solenoid valve is used to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



DTC Logic

INFOID:000000005710208

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0443	EVAP canister purge volume control solenoid valve	A	The canister purge flow is detected during the vehicle is stopped while the engine is running, even when EVAP canister purge volume control solenoid valve is completely closed.	<ul style="list-style-type: none">• EVAP control system pressure sensor• EVAP canister purge volume control solenoid valve (The valve is stuck open.)• EVAP canister vent control valve• EVAP canister• Hoses (Hoses are connected incorrectly or clogged.)
		B	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- Perform "DTC CONFIRMATION PROCEDURE" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Always perform test at a temperature of 5 to 60 °C (41 to 140°F).
- Cool the vehicle so that engine coolant temperature becomes same level as ambient temperature.

Do you have CONSULT-III?

- YES >> GO TO 2.
NO >> GO TO 4.

2. PERFORM DTC CONFIRMATION PROCEDURE A

Ⓜ With CONSULT-III

1. Turn ignition switch ON.
2. Check that the following condition are met.
FUEL T/TMP SE: 0 - 35°C (32 - 95°F)
3. Start engine and wait at least 60 seconds.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-287, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE B

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

[HR16DE]

ⓑ With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
5. Touch "START".
6. Start engine and let it idle until "TESTING" on CONSULT-III changes to "COMPLETED". (It will take approximately 10 seconds.)
If "TESTING" is not displayed after 5 minutes, retry from step 2.
7. Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT-III screen?

- OK >> INSPECTION END
NG >> Go to [EC-287. "Diagnosis Procedure"](#).

4. PERFORM DTC CONFIRMATION PROCEDURE A

ⓐ With GST

1. Turn ignition switch ON.
2. Set voltmeter probes to ECM harness connector terminals.

ECM		Ground
Connector	Terminal	
F11	43 (Fuel tank temperature sensor signal)	Ground

3. Check that the voltage is 3.1 - 4.0 V.
4. Start engine and wait at least 60 seconds.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-287. "Diagnosis Procedure"](#).
NO >> GO TO 5.

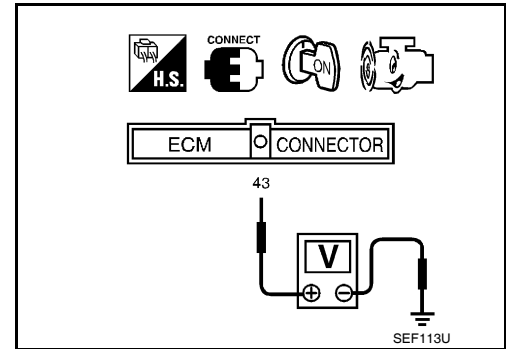
5. PERFORM DTC CONFIRMATION PROCEDURE B

ⓐ With GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 20 seconds.
4. Check 1st trip DTC.

Is 1st trip DTC displayed?

- YES >> Go to [EC-287. "Diagnosis Procedure"](#).
NO >> INSPECTION END



P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

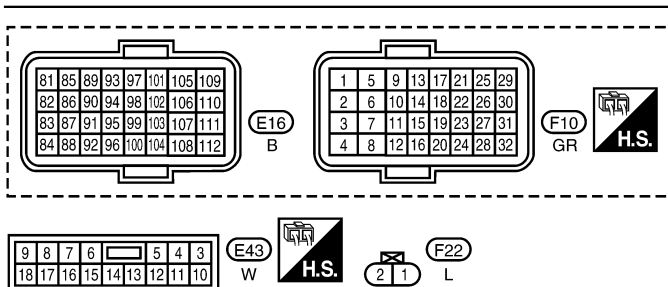
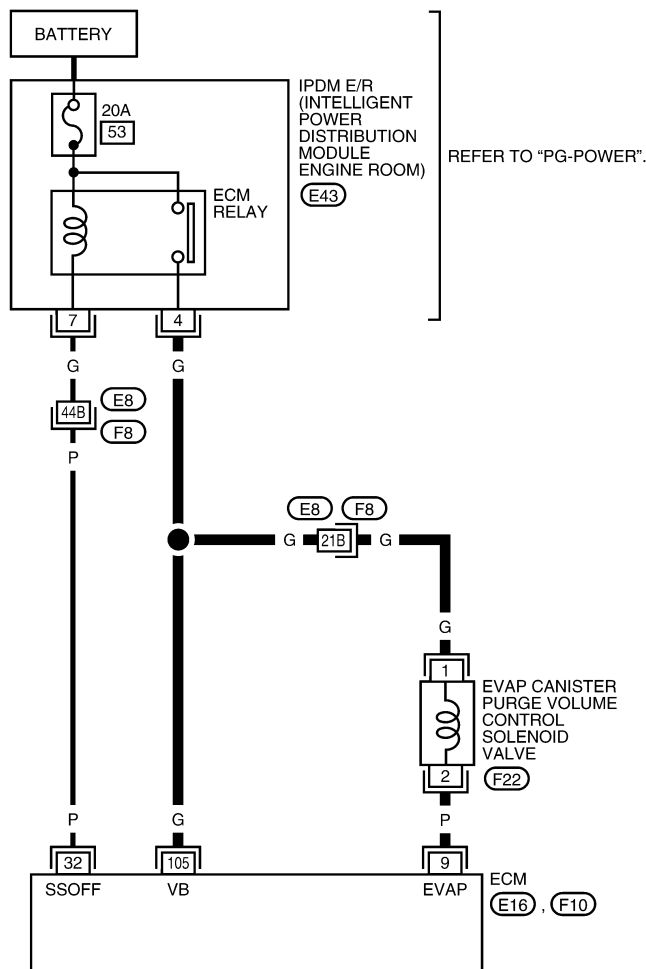
[HR16DE]

Wiring Diagram

INFOID:000000005398447

EC-PGC/V-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
 (F8) - SUPER MULTIPLE JUNCTION (SMJ)

ABBWA0351GB

Diagnosis Procedure

INFOID:000000005398448

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

[HR16DE]

4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

EVAP canister purge volume control solenoid valve		Ground	Voltage
Connector	Terminal		
F22	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- IPDM E/R harness connector E43
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F22	2	F10	9	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Replace EVAP control system pressure sensor.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-308, "Component Inspection"](#).

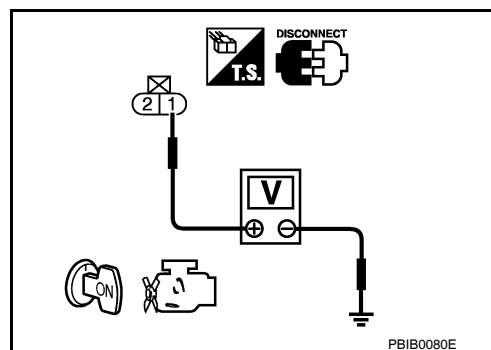
Is the inspection result normal?

- YES-1 >> With CONSULT-III: GO TO 6.
YES-2 >> Without CONSULT-III: GO TO 7.
NO >> Replace EVAP control system pressure sensor.

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

1. Turn ignition switch OFF.



P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[HR16DE]

< COMPONENT DIAGNOSIS >

2. Reconnect harness connectors disconnected.
3. Start engine.
4. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Is the inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-290, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 8.
NO >> Replace EVAP canister purge volume control solenoid valve.

8. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Clean the rubber tube using an air blower.

9. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-298, "Component Inspection"](#).

Is the inspection result normal?

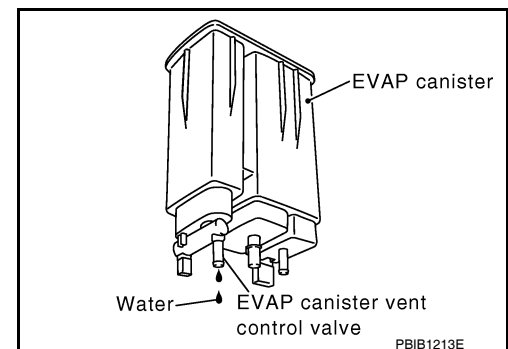
- YES >> GO TO 10.
NO >> Replace EVAP canister vent control valve.

10. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

- YES >> GO TO 11.
NO >> GO TO 13.



11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

- YES >> GO TO 13.
NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

13. CHECK INTERMITTENT INCIDENT

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

[HR16DE]

Refer to [EC-114. "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

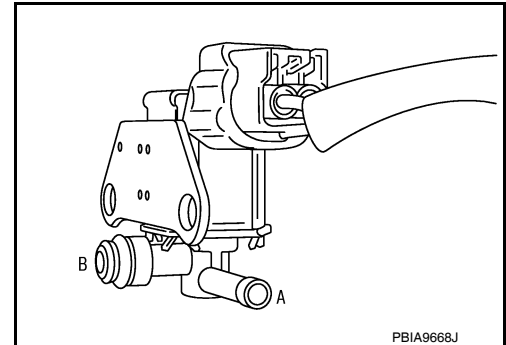
INFOID:000000005398449

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Ⓟ With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Turn ignition switch ON.
5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III.
6. Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

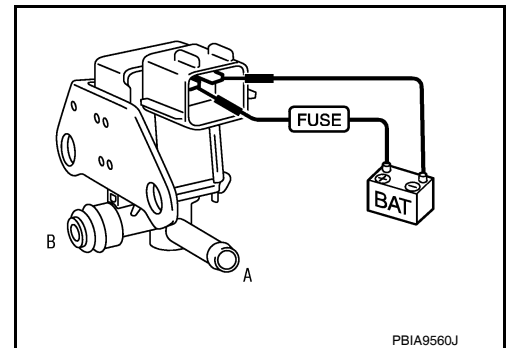
Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



ⓧ Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

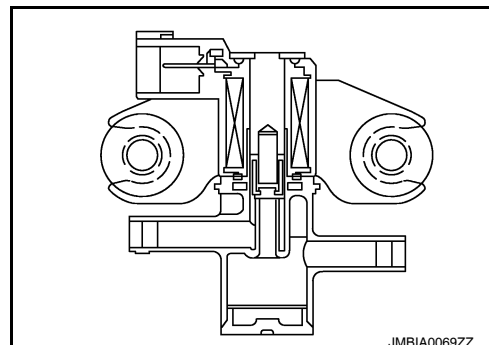
[HR16DE]

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:000000005398450

The EVAP canister purge volume control solenoid valve is used to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



DTC Logic

INFOID:000000005398451

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	<ul style="list-style-type: none"> • Harness or connectors (The solenoid valve circuit is open or shorted.) • EVAP canister purge volume control solenoid valve
P0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	<ul style="list-style-type: none"> • Harness or connectors (The solenoid valve circuit is shorted.) • EVAP canister purge volume control solenoid valve

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 13 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-292. "Diagnosis Procedure"](#).
- NO >> INSPECTION END

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

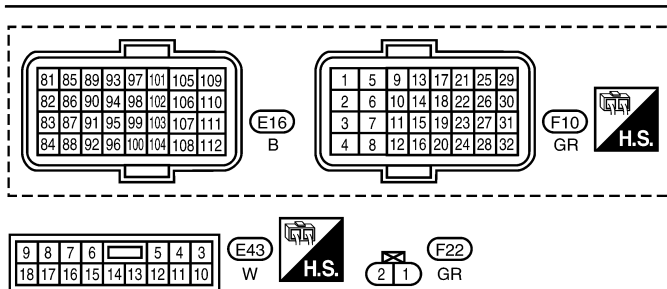
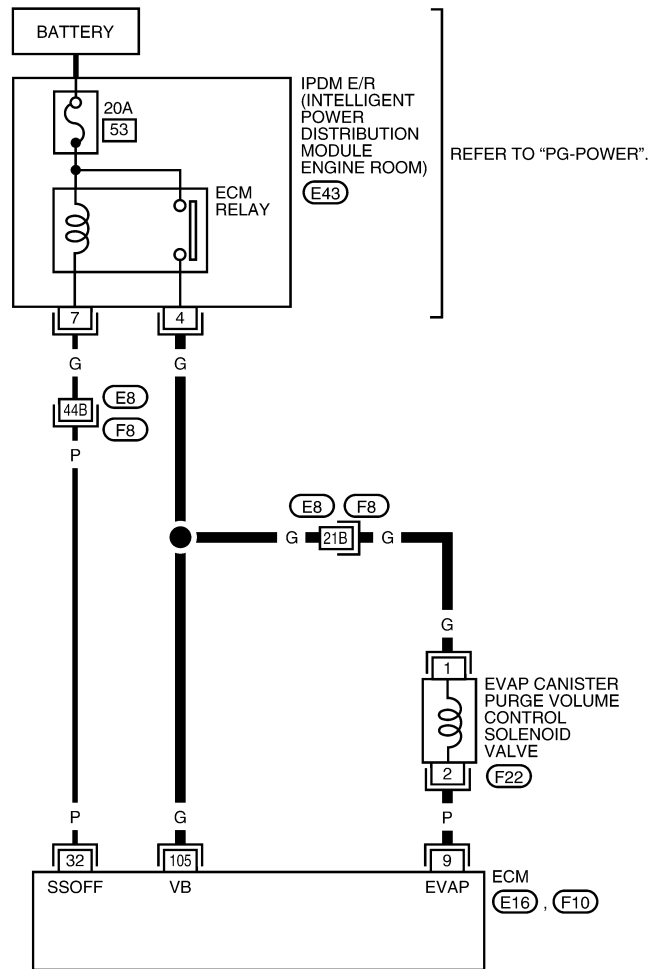
[HR16DE]

Wiring Diagram

INFOID:000000005398452

EC-PGC/V-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

(F8) - SUPER MULTIPLE JUNCTION (SMJ)

BBWA3000E

Diagnosis Procedure

INFOID:000000005398453

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[HR16DE]

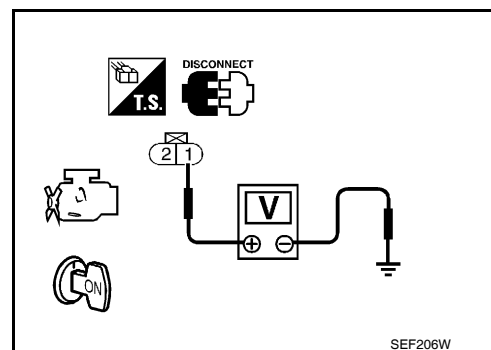
< COMPONENT DIAGNOSIS >

- Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

EVAP canister purge volume control solenoid valve		Ground	Voltage
Connector	Terminal		
F22	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R harness connector E43
- Harness connectors E8, F8
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F22	2	F10	9	Existed

- Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES-1 >> With CONSULT-III: GO TO 4.
YES-2 >> Without CONSULT-III: GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Ⓜ With CONSULT-III

- Reconnect all harness connectors disconnected.
- Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Is the inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 5.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-294, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Replace EVAP canister purge volume control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

[HR16DE]

>> INSPECTION END

Component Inspection

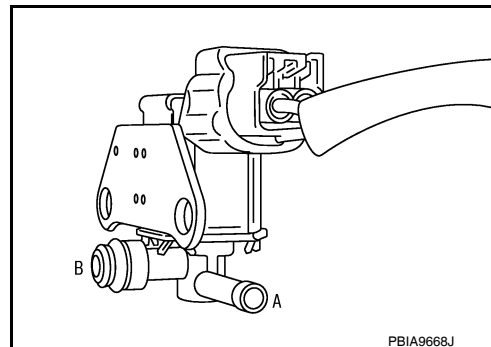
INFOID:000000005398454

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Turn ignition switch ON.
5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III.
6. Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed

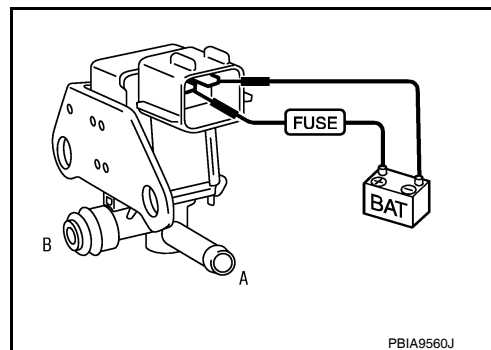


PBIA9668J

Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed



PBIA9560J

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve

P0447 EVAP CANISTER VENT CONTROL VALVE

< COMPONENT DIAGNOSIS >

[HR16DE]

P0447 EVAP CANISTER VENT CONTROL VALVE

Description

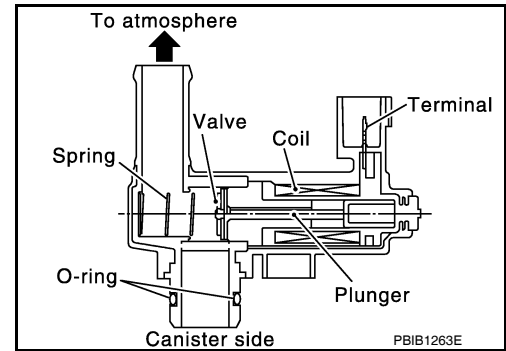
INFOID:000000005398455

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System" diagnosis.



DTC Logic

INFOID:000000005398456

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0447	EVAP canister vent control valve circuit open	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	<ul style="list-style-type: none">• Harness or connectors (The valve circuit is open or shorted.)• EVAP canister vent control valve

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 8 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-296. "Diagnosis Procedure"](#).
NO >> INSPECTION END

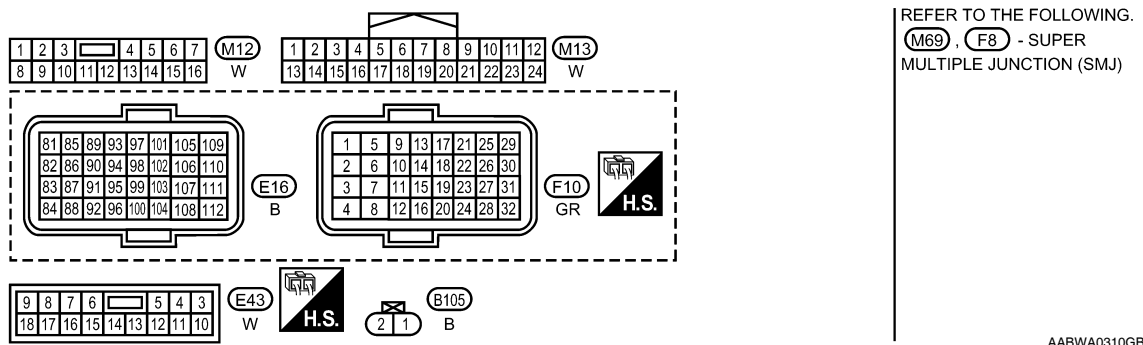
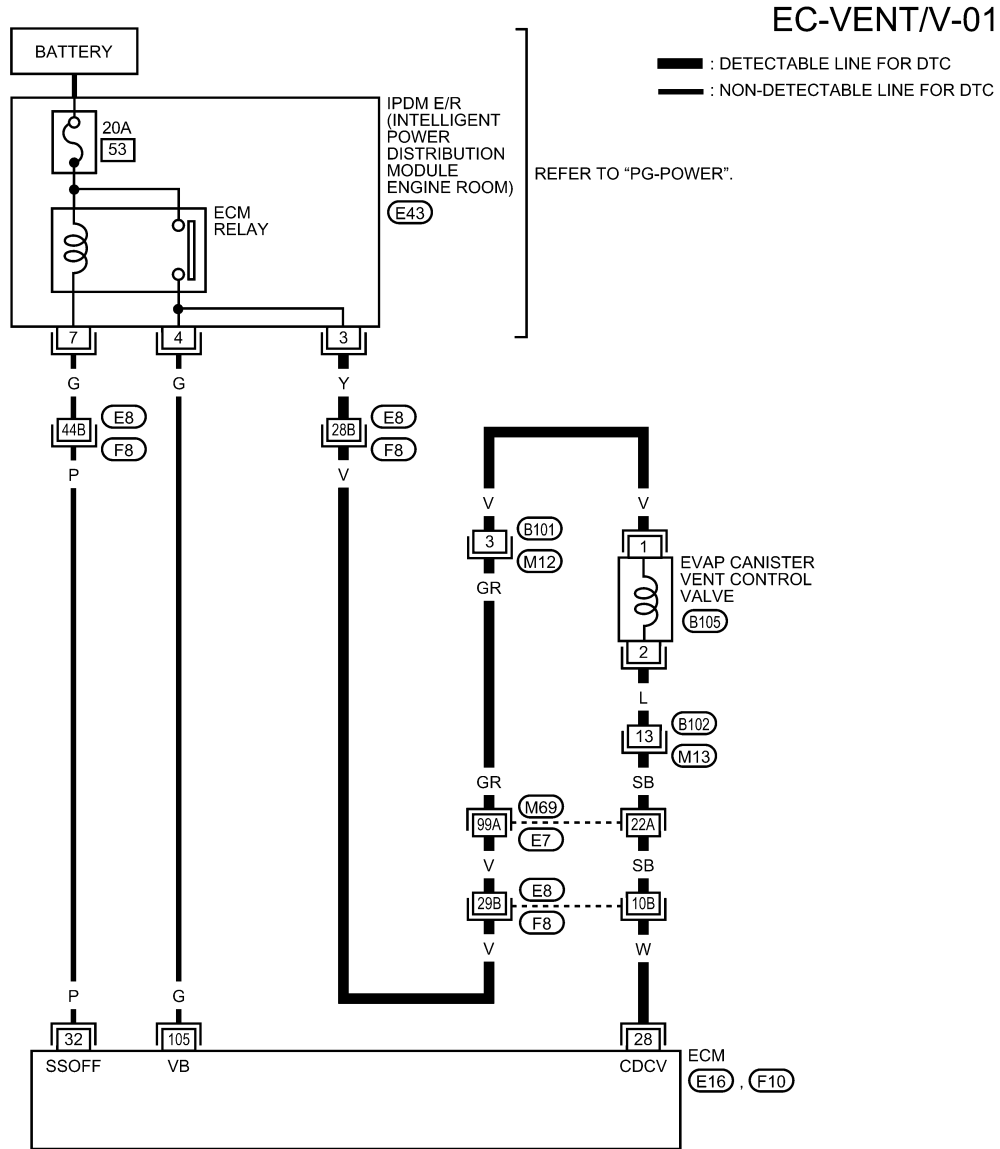
P0447 EVAP CANISTER VENT CONTROL VALVE

< COMPONENT DIAGNOSIS >

[HR16DE]

INFOID:000000005398457

Wiring Diagram



AABWA0310GB

Diagnosis Procedure

INFOID:000000005398458

1. INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

P0447 EVAP CANISTER VENT CONTROL VALVE

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
- NO >> GO TO 3.

2.CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

With CONSULT-III

1. Turn ignition switch OFF and then turn ON.
2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-III.
3. Touch "ON/OFF" on CONSULT-III screen.
4. Check for operating sound of the valve.

Clicking sound should be heard.

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> GO TO 3.

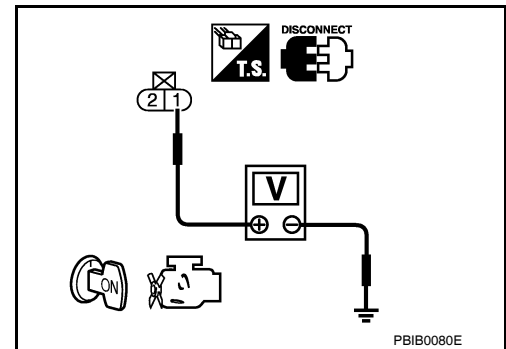
3.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister vent control valve harness connector and ground.

EVAP canister vent control valve		Ground	Voltage
Connector	Terminal		
B105	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> GO TO 4.



4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness connectors E7, M69
- Harness connectors M12, B101
- Harness for open or short between EVAP canister vent control valve and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP canister vent control valve harness connector and ECM harness connector.

EVAP canister vent control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B105	2	E16	28	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Junction block connector F8, E8

P0447 EVAP CANISTER VENT CONTROL VALVE

[HR16DE]

< COMPONENT DIAGNOSIS >

- Harness connectors E7, M69
- Harness connectors M13, B102
- Harness for open or short between EVAP canister vent control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

- YES >> GO TO 8.
NO >> Clean the rubber tube using an air blower.

8. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-298, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Replace EVAP canister vent control valve.

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

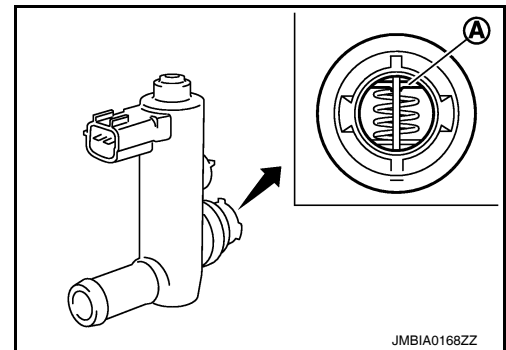
INFOID:000000005398459

1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Turn ignition switch OFF.
2. Remove EVAP canister vent control valve from EVAP canister.
3. Check portion (A) of EVAP canister vent control valve for being rusted.

Is it rusted?

- YES >> Replace EVAP canister vent control valve.
NO >> GO TO 2.



2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

Ⓟ With CONSULT-III

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.
Make sure new O-ring is installed properly.

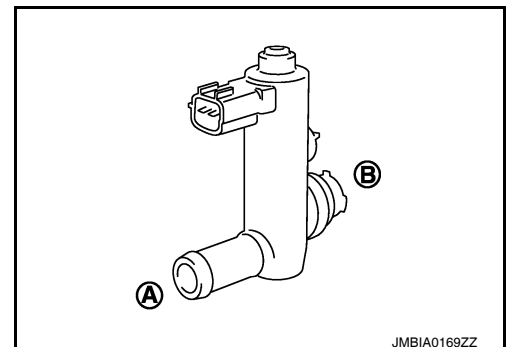
VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

ⓧ Without CONSULT-III

Check air passage continuity and operation delay time under the following conditions.

Make sure new O-ring is installed properly.



P0447 EVAP CANISTER VENT CONTROL VALVE

[HR16DE]

< COMPONENT DIAGNOSIS >

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace EVAP canister vent control valve.

3. CHECK EVAP CANISTER VENT CONTROL VALVE-III

Ⓜ With CONSULT-III

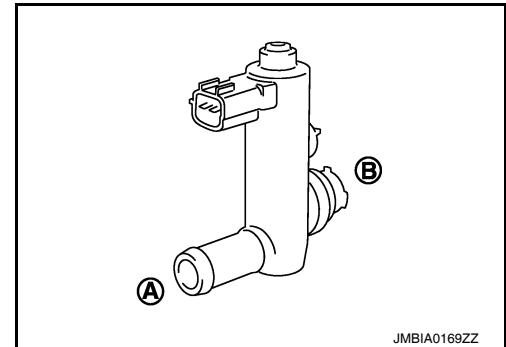
1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
3. Check air passage continuity and operation delay time.
Make sure new O-ring is installed properly.

VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

ⓧ Without CONSULT-III

1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
2. Check air passage continuity and operation delay time under the following conditions.
Make sure new O-ring is installed properly.



Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve.

P0448 EVAP CANISTER VENT CONTROL VALVE

< COMPONENT DIAGNOSIS >

[HR16DE]

P0448 EVAP CANISTER VENT CONTROL VALVE

Description

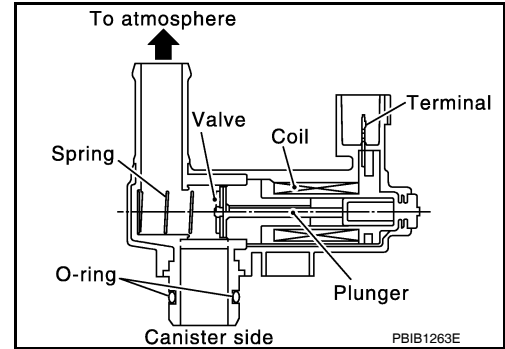
INFOID:000000005398460

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System" diagnosis.



DTC Logic

INFOID:000000005398461

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0448	EVAP canister vent control valve close	EVAP canister vent control valve remains closed under specified driving conditions.	<ul style="list-style-type: none">• EVAP canister vent control valve• EVAP control system pressure sensor and the circuit• Blocked rubber tube to EVAP canister vent control valve• EVAP canister is saturated with water

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT-III

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
4. Start engine and let it idle for at least 1 minute.
5. Repeat next procedures three times.
 - Increase the engine speed up to 3,000 to 3,500 rpm and keep it for 2 minutes and 50 seconds to 3 minutes.

Never exceed 3 minutes.

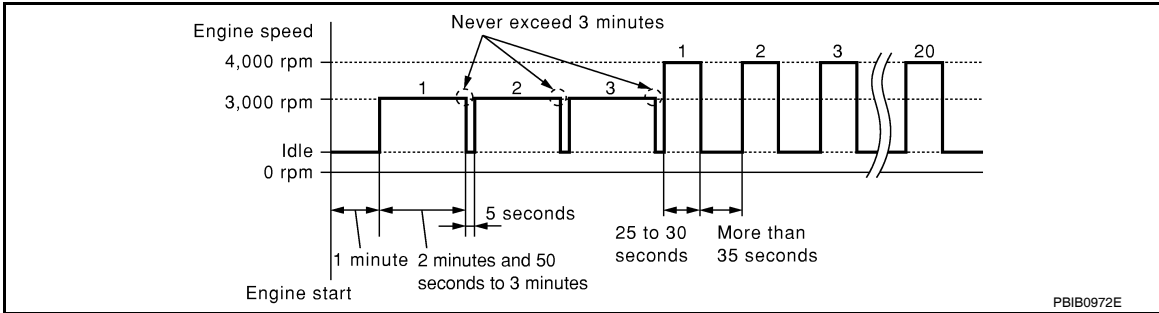
- Fully released accelerator pedal and keep engine idle for about 5 seconds.
6. Repeat next procedure 20 times.
 - Quickly increase the engine speed up to 4,000 to 4,500 rpm or more and keep it for 25 to 30 seconds.

P0448 EVAP CANISTER VENT CONTROL VALVE

< COMPONENT DIAGNOSIS >

[HR16DE]

- Fully released accelerator pedal and keep engine idle for at least 35 seconds.



7. Check 1st trip DTC.

 **With GST**

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

- YES >> Go to [EC-302. "Diagnosis Procedure"](#).
- NO >> INSPECTION END

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

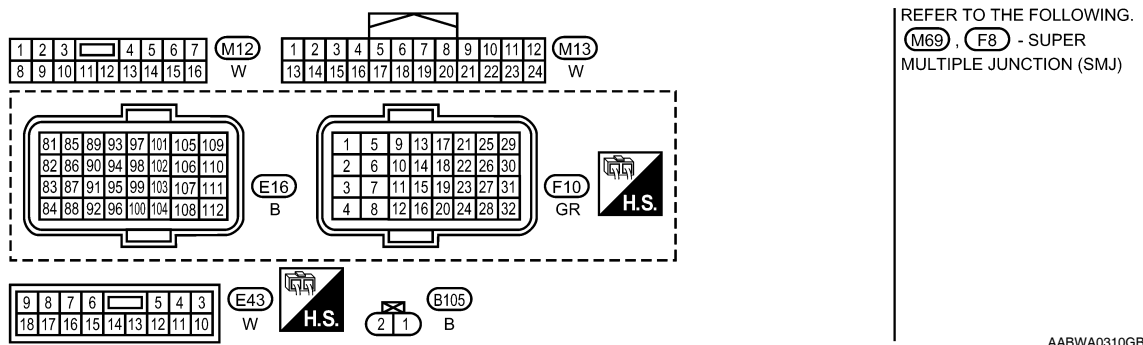
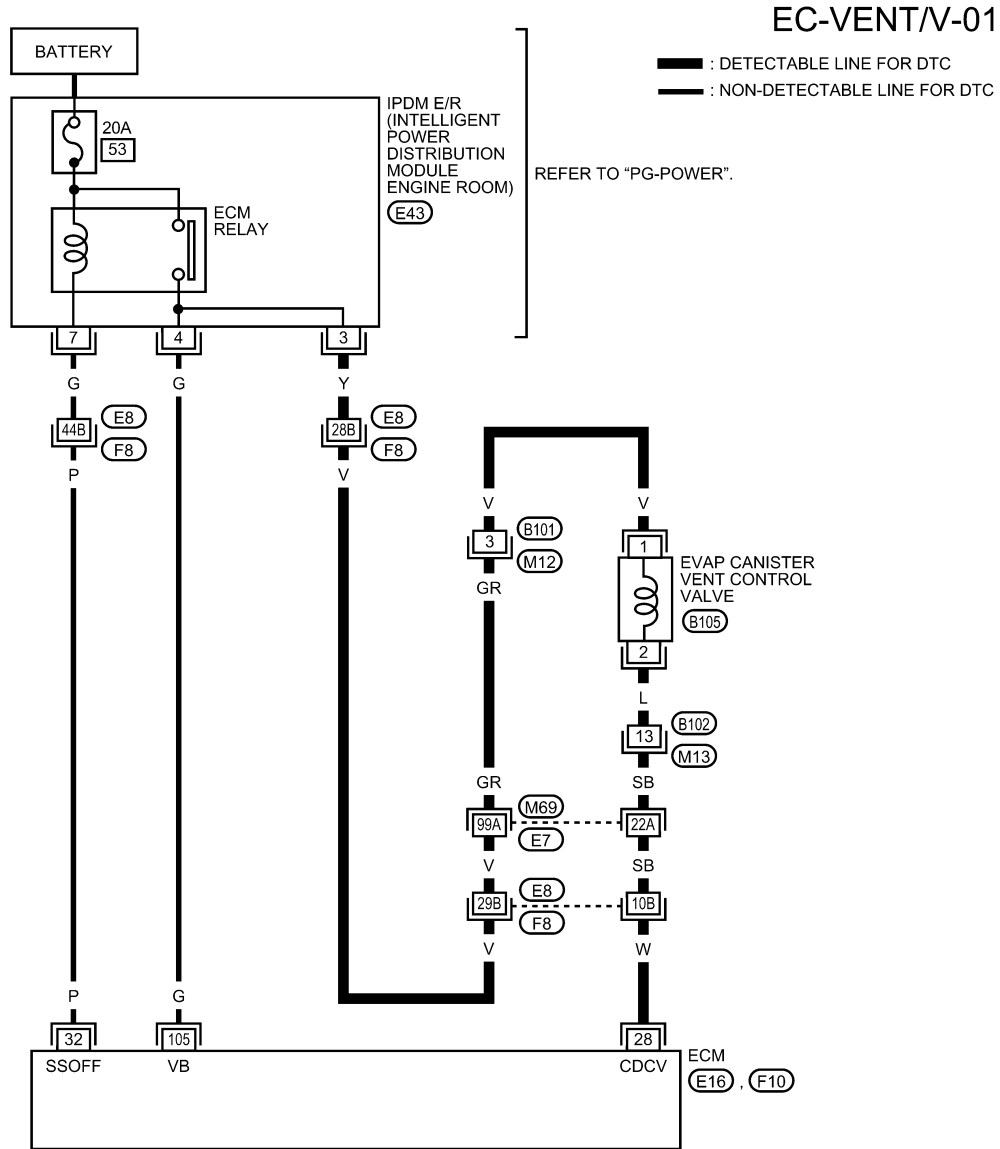
P0448 EVAP CANISTER VENT CONTROL VALVE

< COMPONENT DIAGNOSIS >

[HR16DE]

INFOID:000000005398462

Wiring Diagram



AABWA0310GB

Diagnosis Procedure

INFOID:000000005398463

1. CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. Check the rubber tube for clogging.

P0448 EVAP CANISTER VENT CONTROL VALVE

[HR16DE]

< COMPONENT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Clean rubber tube using an air blower.

2.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-304, "Component Inspection"](#).

Is the inspection result normal?

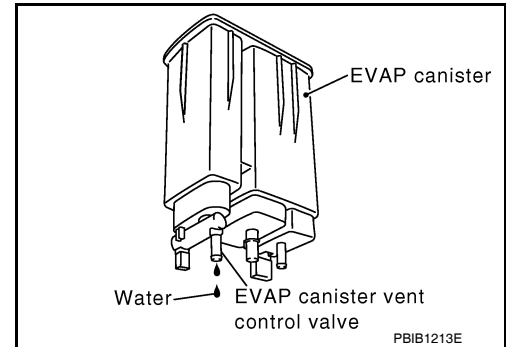
- YES >> GO TO 3.
- NO >> Replace EVAP canister vent control valve.

3.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister.

Does water drain from EVAP canister?

- YES >> GO TO 4.
- NO >> GO TO 6.



4.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Replace EVAP control system pressure sensor.

7.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-308, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Replace EVAP control system pressure sensor.

8.CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

P0448 EVAP CANISTER VENT CONTROL VALVE

< COMPONENT DIAGNOSIS >

[HR16DE]

>> INSPECTION END

Component Inspection

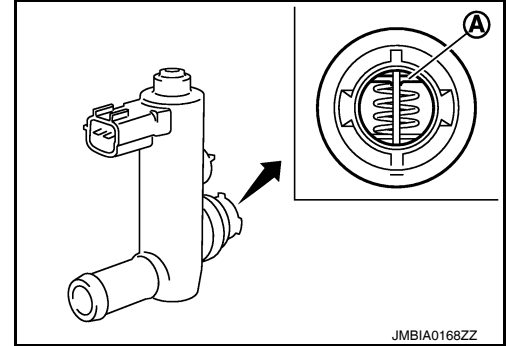
INFOID:000000005398464

1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Turn ignition switch OFF.
2. Remove EVAP canister vent control valve from EVAP canister.
3. Check portion (A) of EVAP canister vent control valve for being rusted.

Is it rusted?

- YES >> Replace EVAP canister vent control valve.
 NO >> GO TO 2.



2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-III

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.
Make sure new O-ring is installed properly.

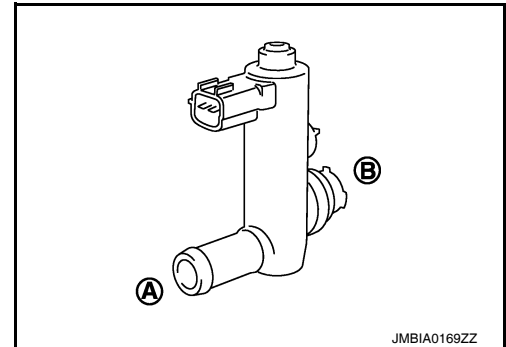
VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT-III

Check air passage continuity and operation delay time under the following conditions.

Make sure new O-ring is installed properly.



Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Replace EVAP canister vent control valve.

3. CHECK EVAP CANISTER VENT CONTROL VALVE-III

With CONSULT-III

1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

P0448 EVAP CANISTER VENT CONTROL VALVE

[HR16DE]

< COMPONENT DIAGNOSIS >

3. Check air passage continuity and operation delay time.
Make sure new O-ring is installed properly.

VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

⊗ Without CONSULT-III

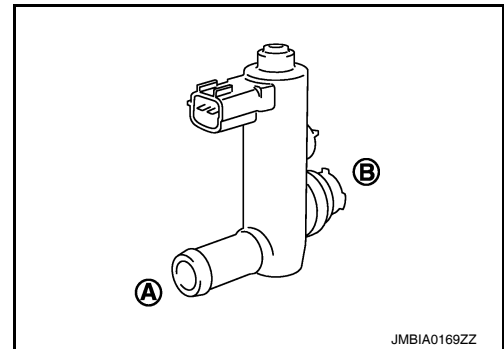
- Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- Check air passage continuity and operation delay time under the following conditions.
Make sure new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Replace EVAP canister vent control valve.



A
 EC
 C
 D
 E
 F
 G
 H
 I
 J
 K
 L
 M
 N
 O
 P

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

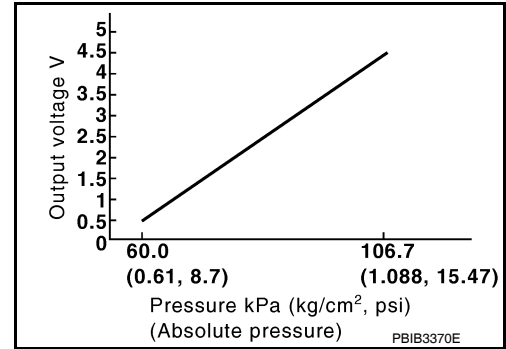
[HR16DE]

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description

INFOID:000000005398465

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



DTC Logic

INFOID:000000005398466

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0451	EVAP control system pressure sensor performance	ECM detects a sloshing signal from the EVAP control system pressure sensor	<ul style="list-style-type: none"> • Harness or connectors (EVAP control system pressure sensor circuit is shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Crankshaft position sensor (POS) • Accelerator pedal position sensor • Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and wait at least 40 seconds.

NOTE:

Do not depress accelerator pedal even slightly.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-306, "Diagnosis Procedure"](#).
 NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398467

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace harness connector.

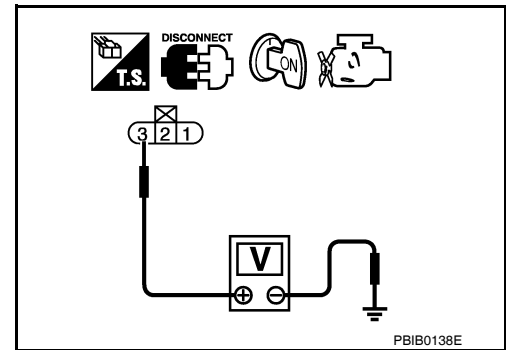
3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control system pressure sensor		Ground	Voltage
Connector	Terminal		
B104	3	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 4.



4. CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
	76	EVAP control system pressure sensor	B104	3
E16	102	APP sensor	E12	5

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

5. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to [EC-261. "Component Inspection"](#).)
- Refrigerant pressure sensor (Refer to [EC-451. "Diagnosis Procedure"](#).)

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Replace malfunctioning component.

6. CHECK APP SENSOR

Refer to [EC-395. "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 9.
NO >> GO TO 7.

7. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly
2. Perform [EC-395. "Special Repair Requirement"](#).

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

>> INSPECTION END

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-308. "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Replace EVAP control system pressure sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-114. "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398468

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister.
Always replace O-ring with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

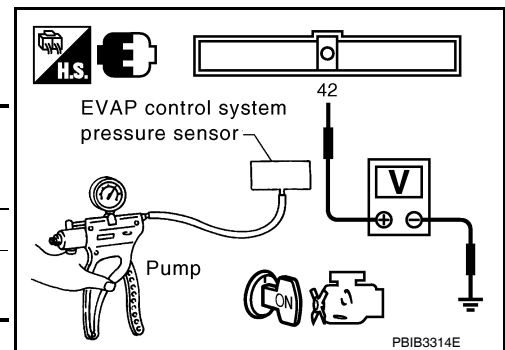
ECM		Condition [Applied vacuum kPa (kg/cm ² , psi)]	Voltage
Connector	Terminal		
F11	42 (EVAP control system pressure sensor signal)	Not applied	1.8 - 4.8 V
		-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace EVAP control system pressure sensor



P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

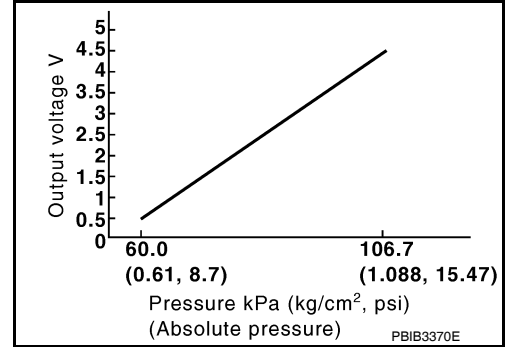
[HR16DE]

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description

INFOID:000000005398469

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



DTC Logic

INFOID:000000005398470

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452	EVAP control system pressure sensor low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Crankshaft position sensor (POS) • Accelerator pedal position sensor • Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select "DATA MONITOR" mode with CONSULT-III.
5. Make sure that "FUEL T/TMP SE" indication is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. Check 1st trip DTC.

With GST

1. Start engine and warm it up to normal operating temperature.

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

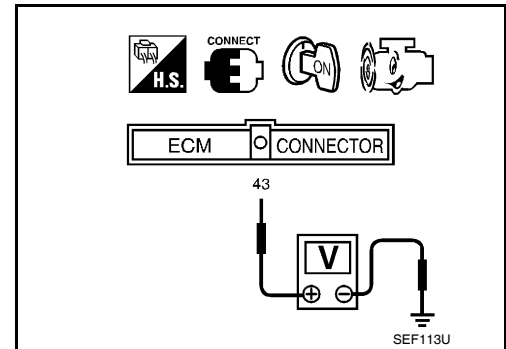
2. Set voltmeter probes to ECM harness connector and ground as per the following.

ECM		Ground
Connector	Terminal	
F11	43 (Fuel tank temperature sensor signal)	Ground

3. Make sure that the voltage is less than 4.2 V.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and wait at least 20 seconds.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-311, "Diagnosis Procedure"](#).
NO >> INSPECTION END



P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

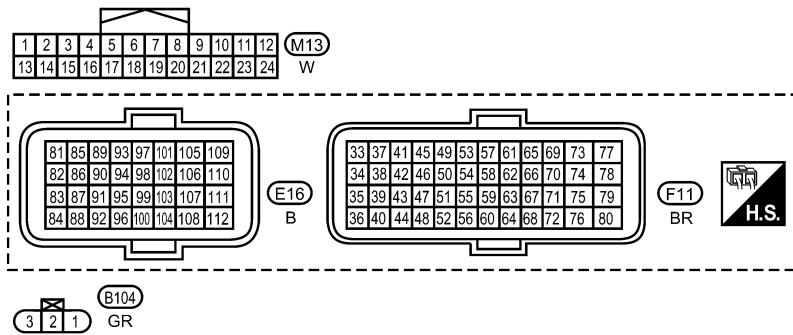
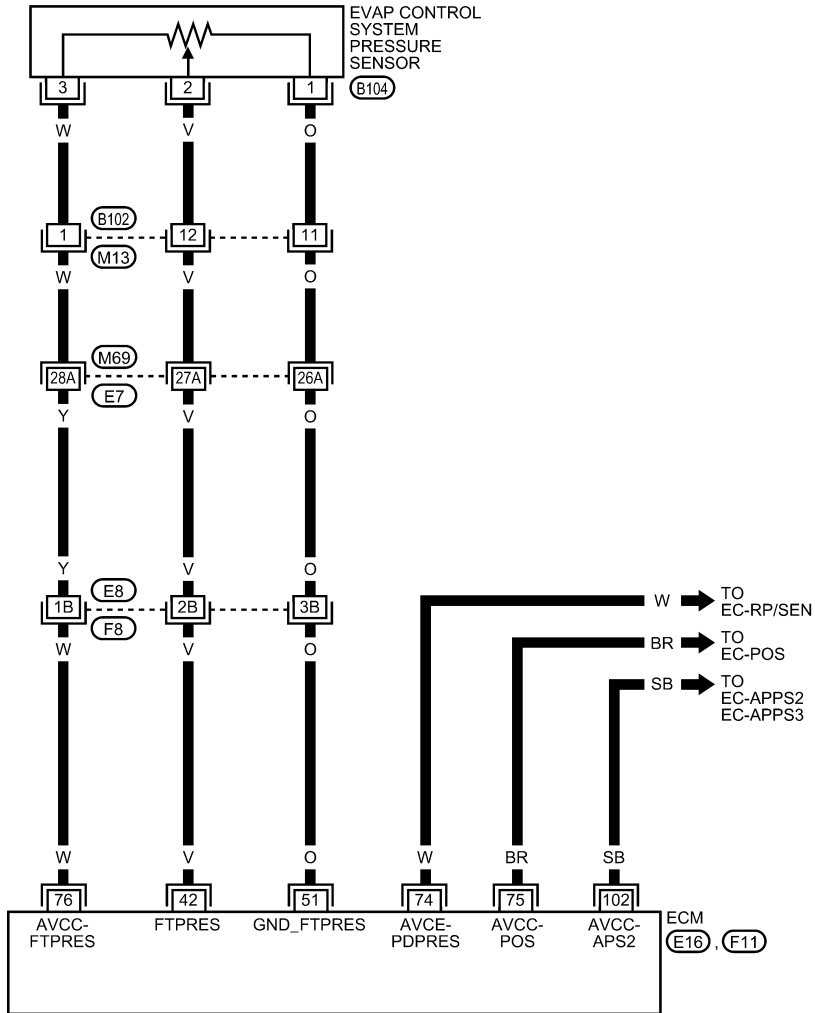
[HR16DE]

Wiring Diagram

INFOID:000000005398471

EC-PRE/SE-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
 (M69), (F8) - SUPER
 MULTIPLE JUNCTION (SMJ)

AABWA0311GB

Diagnosis Procedure

INFOID:000000005398472

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace harness connector.

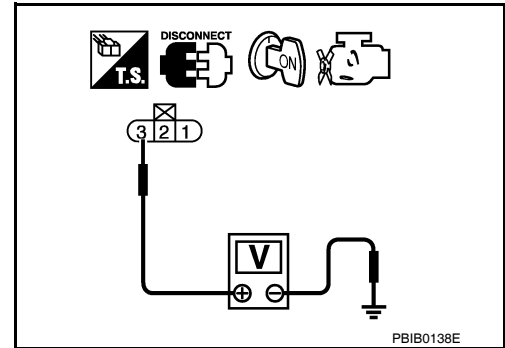
3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control system pressure sensor		Ground	Voltage
Connector	Terminal		
B104	3	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> GO TO 10.
NO >> GO TO 4.



4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B104	3	F11	76	Existed

Is the inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B102, M13
- Harness connectors M69, E7
- Harness connectors E8, F8
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
	76	EVAP control system pressure sensor	B104	3
E16	102	APP sensor	E12	5

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair short to ground or short to power in harness or connectors.

7. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to [EC-261, "Component Inspection"](#).)
- Refrigerant pressure sensor (Refer to [EC-451, "Diagnosis Procedure"](#).)

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace malfunctioning component.

8. CHECK APP SENSOR

Refer to [EC-395, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly
2. Perform [EC-395, "Special Repair Requirement"](#).

>> INSPECTION END

10. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B104	1	F11	51	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B102, M13
- Harness connectors M69, E7
- Harness connectors E8, F8
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

12. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B104	2	F11	42	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B102, M13
- Harness connectors M69, E7
- Harness connectors E8, F8
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-314, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace EVAP control system pressure sensor.

15. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398473

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

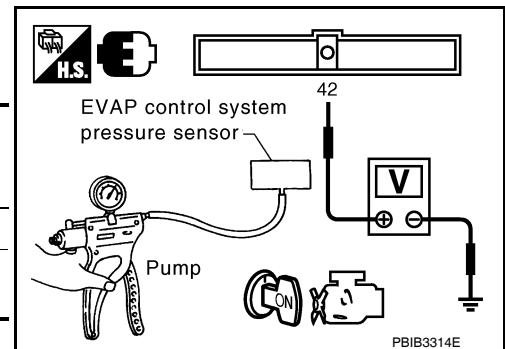
1. Turn ignition switch OFF.
2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister.
Always replace O-ring with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

ECM		Condition [Applied vacuum kPa (kg/cm ² , psi)]	Voltage
Connector	Terminal		
F11	42 (EVAP control system pressure sensor signal)	Not applied	1.8 - 4.8 V
		-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).

Is the inspection result normal?



P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

YES >> INSPECTION END
NO >> Replace EVAP control system pressure sensor

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

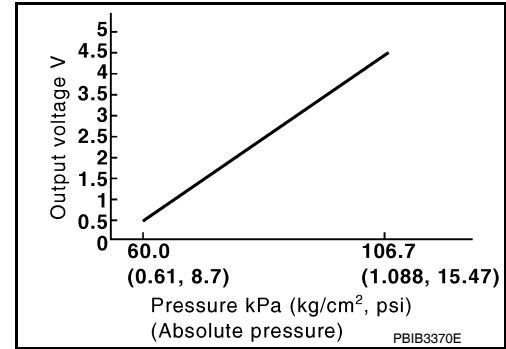
[HR16DE]

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description

INFOID:000000005398474

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



DTC Logic

INFOID:000000005398475

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0453	EVAP control system pressure sensor high input	An excessively high voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Accelerator pedal circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Crankshaft position sensor (POS) • Accelerator pedal position sensor • Refrigerant pressure sensor • EVAP canister vent control valve • EVAP canister • Rubber hose from EVAP canister vent control valve to vehicle frame

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select "DATA MONITOR" mode with CONSULT-III.
5. Make sure that "FUEL T/TMP SE" indication is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. Check 1st trip DTC.

Ⓢ With GST

1. Start engine and warm it up to normal operating temperature.

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

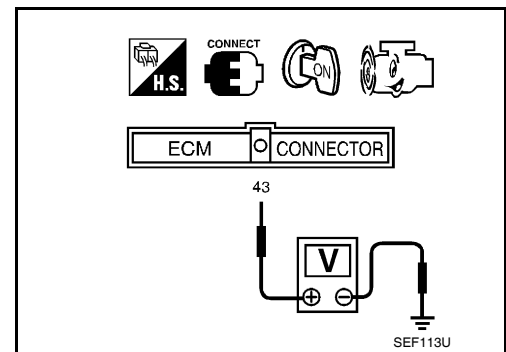
- Set voltmeter probes to ECM harness connector and ground as per the following.

ECM		Ground
Connector	Terminal	
F11	43 (Fuel tank temperature sensor signal)	Ground

- Make sure that the voltage is less than 4.2 V.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and wait at least 20 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-318, "Diagnosis Procedure"](#).
 NO >> INSPECTION END



A
 EC
 C
 D
 E
 F
 G
 H
 I
 J
 K
 L
 M
 N
 O
 P

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

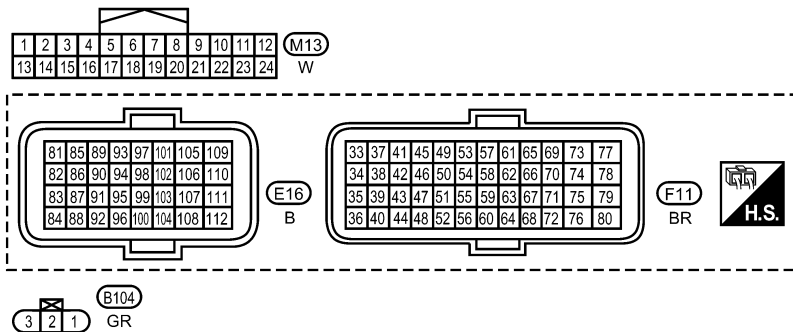
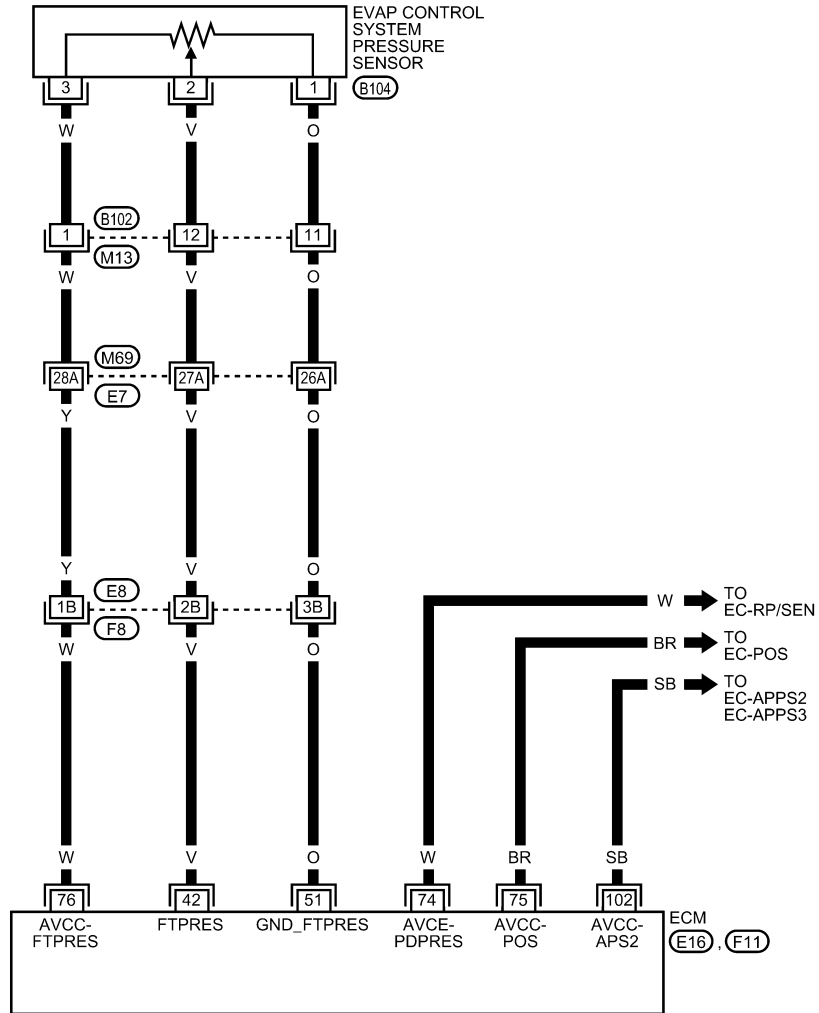
[HR16DE]

Wiring Diagram

INFOID:000000005398476

EC-PRE/SE-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
 (M69), (F8) - SUPER
 MULTIPLE JUNCTION (SMJ)

AABWA0311GB

Diagnosis Procedure

INFOID:000000005398477

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
 NO >> Repair or replace ground connection.

2.CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Repair or replace harness connector.

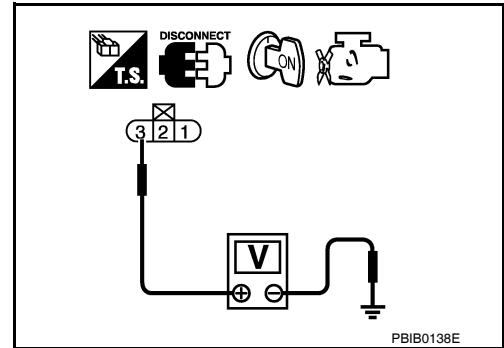
3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control system pressure sensor		Ground	Voltage
Connector	Terminal		
B104	3	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> GO TO 10.
 NO >> GO TO 4.



4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B104	3	F11	76	Existed

Is the inspection result normal?

- YES >> GO TO 6.
 NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B102, M13
- Harness connectors M69, E7
- Harness connectors E8, F8
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
	76	EVAP control system pressure sensor	B104	3
E16	102	APP sensor	E12	5

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair short to ground or short to power in harness or connectors.

7. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to [EC-261, "Component Inspection"](#).)
- Refrigerant pressure sensor (Refer to [EC-451, "Diagnosis Procedure"](#).)

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace malfunctioning component.

8. CHECK APP SENSOR

Refer to [EC-395, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly
2. Perform [EC-395, "Special Repair Requirement"](#).

>> INSPECTION END

10. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B104	1	F11	51	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B102, M13
- Harness connectors M69, E7
- Harness connectors E8, F8
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

12. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B104	2	F11	42	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B102, M13
- Harness connectors M69, E7
- Harness connectors E8, F8
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK RUBBER TUBE

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 15.

NO >> Clean the rubber tube using an air blower, repair or replace rubber tube.

15. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-298. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace EVAP canister vent control valve.

16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-322. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 17.

NO >> Replace EVAP control system pressure sensor.

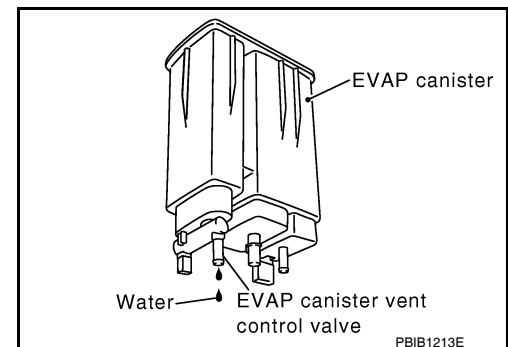
17. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister.

Does water drain from EVAP canister?

YES >> GO TO 18.

NO >> GO TO 20.



P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

18. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 14.

19. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

20. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398478

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister.
Always replace O-ring with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

ECM		Condition [Applied vacuum kPa (kg/cm ² , psi)]	Voltage
Connector	Terminal		
F11	42 (EVAP control system pressure sensor signal)	Not applied	1.8 - 4.8 V
		-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value

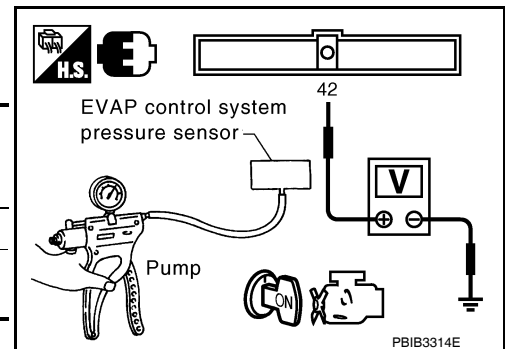
CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP control system pressure sensor



P0455 EVAP CONTROL SYSTEM

< COMPONENT DIAGNOSIS >

[HR16DE]

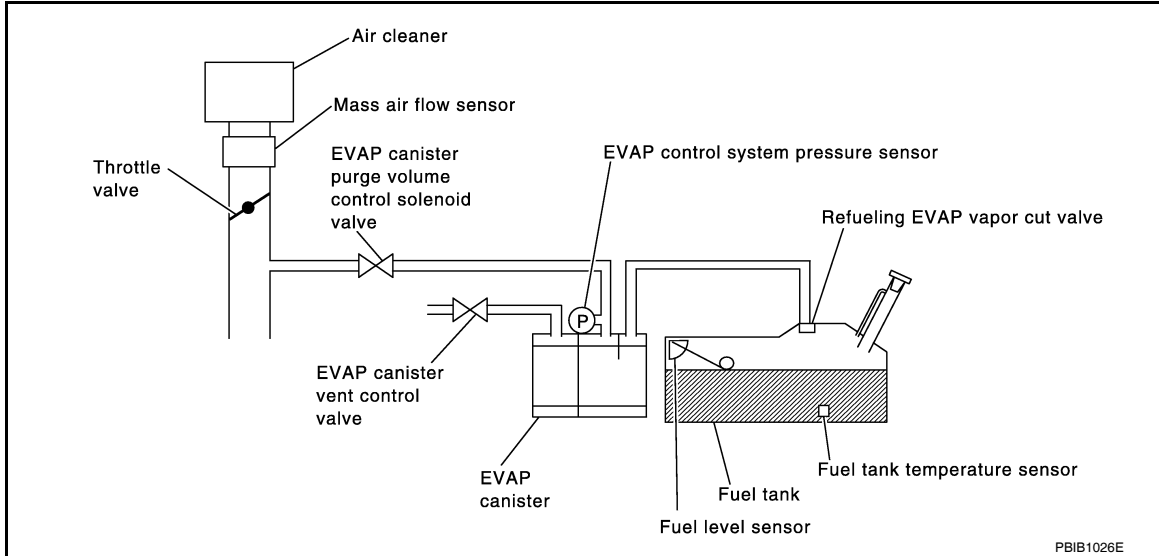
P0455 EVAP CONTROL SYSTEM

DTC Logic

INFOID:000000005398479

DTC DETECTION LOGIC

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0455	EVAP control system gross leak detected	EVAP control system has a very large leak such as fuel filler cap fell off, EVAP control system does not operate properly.	<ul style="list-style-type: none"> Fuel filler cap remains open or fails to close. Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Foreign matter caught in fuel filler cap. Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. Foreign matter caught in EVAP canister vent control valve. EVAP canister or fuel tank leaks EVAP purge line (pipe and rubber tube) leaks EVAP purge line rubber tube bent. Loose or disconnected rubber tube EVAP canister vent control valve and the circuit EVAP canister purge volume control solenoid valve and the circuit Fuel tank temperature sensor O-ring of EVAP canister vent control valve is missing or damaged. EVAP control system pressure sensor Refueling EVAP vapor cut valve ORVR system leaks Drain filter

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

P0455 EVAP CONTROL SYSTEM

< COMPONENT DIAGNOSIS >

[HR16DE]

CAUTION:

Never remove fuel filler cap during the DTC CONFIRMATION PROCEDURE.

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

TESTING CONDITION:

- Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedures.

Do you have CONSULT-III?

- YES >> GO TO 2.
- NO >> GO TO 4.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Tighten fuel filler cap securely until ratcheting sound is heard.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
5. Make sure that the following conditions are met.
COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
INT/A TEMP SE: 0 - 60°C (32 - 140°F)
6. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to [EC-20, "BASIC INSPECTION : Special Repair Requirement"](#).

Which is displayed on CONSULT-III screen?

- OK >> INSPECTION END
- NG >> GO TO 3.

3.CHECK DTC

Check DTC.

Which DTC is detected?

- P0455 >> Go to [EC-324, "Diagnosis Procedure"](#).
- P0442 >> Go to [EC-279, "Diagnosis Procedure"](#).

4.PERFORM DTC CONFIRMATION PROCEDURE

With GST

NOTE:

Be sure to read the explanation of DRIVING PATTERN in [EC-471, "How to Set SRT Code"](#) before driving vehicle.

1. Start engine.
2. Drive vehicle according to DRIVING PATTERN.
3. Stop vehicle.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES-1 >> P0455: Go to [EC-324, "Diagnosis Procedure"](#).
- YES-2 >> P0442: Go to [EC-279, "Diagnosis Procedure"](#).
- YES-3 >> P0441: Go to [EC-274, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398480

1.CHECK FUEL FILLER CAP DESIGN

P0455 EVAP CONTROL SYSTEM

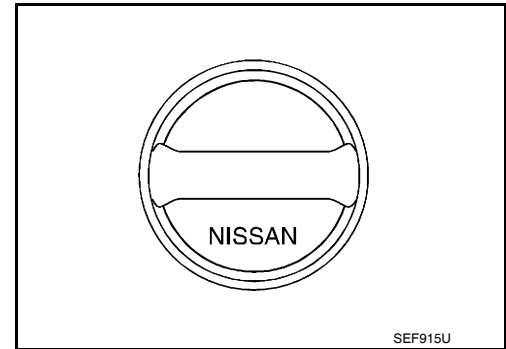
[HR16DE]

< COMPONENT DIAGNOSIS >

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Replace with genuine NISSAN fuel filler cap.



2.CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Then retighten until ratcheting sound is heard.

3.CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to [EC-327. "Component Inspection \(Fuel filler cap\)".](#)

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Replace fuel filler cap with a genuine one.

5.CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection.

Refer to [EC-68. "System Description".](#)

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair or reconnect the hose.

6.CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 7.

7.CHECK DRAIN FILTER

Refer to [EC-328. "Component Inspection \(Drain filter\)".](#)

Is the inspection result normal?

- YES >> GO TO 8.
NO >> Replace drain filter.

8.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly.
Refer to [EC-500. "Exploded View".](#)
- EVAP canister vent control valve.
Refer to [EC-298. "Component Inspection".](#)

P0455 EVAP CONTROL SYSTEM

[HR16DE]

< COMPONENT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace EVAP canister vent control valve and O-ring.

9. CHECK FOR EVAP LEAK

Refer to [EC-498. "Inspection"](#).

Is there any leak in EVAP line?

YES >> Repair or replace.

NO-1 >> With CONSULT-III: GO TO 10.

NO-2 >> Without CONSULT-III: GO TO 11.

10. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-III screen to increase "PURG VOL C/V" opening to 100%.
5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 12.

12. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to [EC-68. "System Description"](#).

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 13.

YES-2 >> Without CONSULT-III: GO TO 14.

NO >> Repair or reconnect the hose.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 15.

NO >> GO TO 14.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-290. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 15.

P0455 EVAP CONTROL SYSTEM

< COMPONENT DIAGNOSIS >

[HR16DE]

NO >> Replace EVAP canister purge volume control solenoid valve.

15.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to [EC-238, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace fuel level sensor unit.

16.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-308, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 17.

NO >> Replace EVAP control system pressure sensor.

17.CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to [EC-443, "Description"](#).

Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair or replace hoses and tubes.

18.CHECK RECIRCULATION LINE

Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 19.

NO >> Repair or replace hose, tube or fuel filler tube.

19.CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to [EC-446, "Component Inspection \(Refueling EVAP vapor cut valve\)"](#).

Is the inspection result normal?

YES >> GO TO 20.

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

20.CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

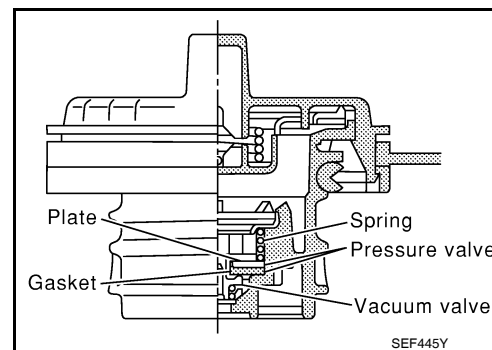
>> INSPECTION END

Component Inspection (Fuel filler cap)

INFOID:000000005398481

1.CHECK FUEL FILLER CAP

1. Turn ignition switch OFF.
2. Remove fuel filler cap.
3. Wipe clean valve housing.



P0455 EVAP CONTROL SYSTEM

[HR16DE]

< COMPONENT DIAGNOSIS >

4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.
5. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE FUEL FILLER CAP

Replace fuel filler cap.

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.

>> INSPECTION END

Component Inspection (Drain filter)

INFOID:000000005398482

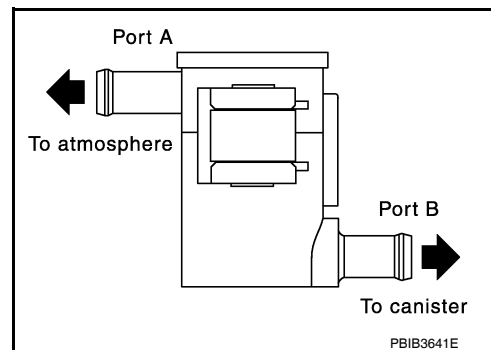
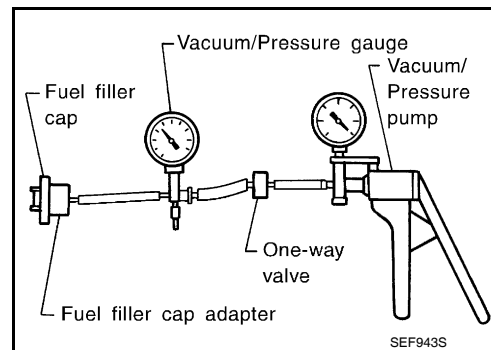
1. CHECK DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace drain filter.



P0456 EVAP CONTROL SYSTEM

< COMPONENT DIAGNOSIS >

[HR16DE]

P0456 EVAP CONTROL SYSTEM

DTC Logic

INFOID:000000005398483

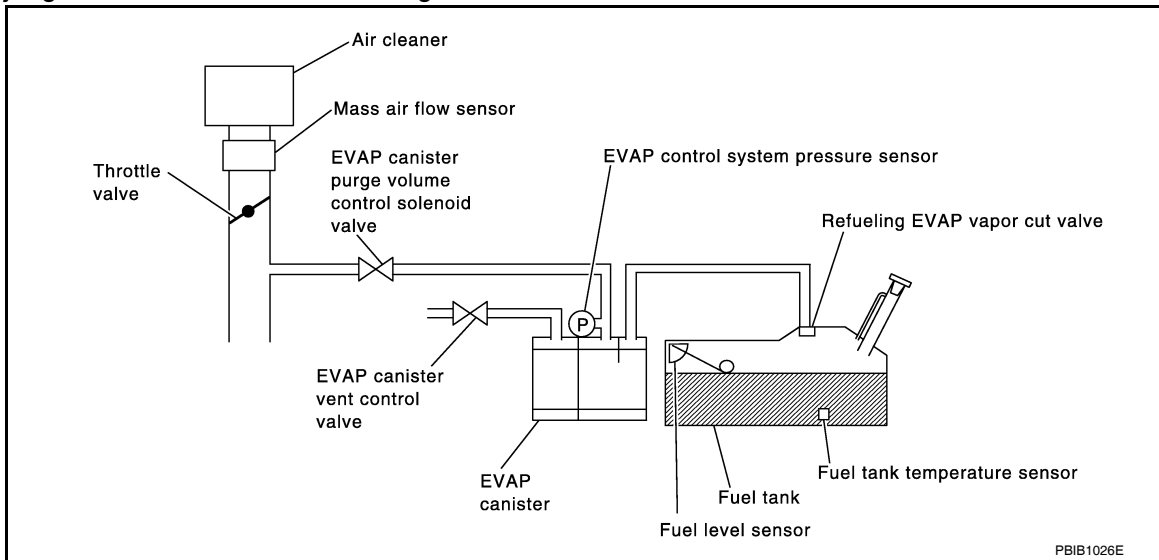
DTC DETECTION LOGIC

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.

If ECM judges a leak which corresponds to a very small leak, the very small leak P0456 will be detected.

If ECM judges a leak equivalent to a small leak, EVAP small leak P0442 will be detected.

If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0456	Evaporative emission control system very small leak (negative pressure check)	<ul style="list-style-type: none"> • EVAP system has a very small leak. • EVAP system does not operate properly. 	<ul style="list-style-type: none"> • Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Fuel tank temperature sensor • O-ring of EVAP canister vent control valve is missing or damaged • EVAP canister is saturated with water • EVAP control system pressure sensor • Refueling EVAP vapor cut valve • ORVR system leaks • Fuel level sensor and the circuit • Foreign matter caught in EVAP canister purge volume control solenoid valve • Drain filter

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.

P0456 EVAP CONTROL SYSTEM

[HR16DE]

< COMPONENT DIAGNOSIS >

- Use only a genuine NISSAN rubber tube as a replacement.

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 4.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

NOTE:

- If DTC P0456 is displayed with P0442, first perform trouble diagnosis for DTC P0456.
- After repair, make sure that the hoses and clips are installed properly.
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

TESTING CONDITION:

- Open engine hood before conducting following procedure.
- If any of following conditions are met just before the DTC CONFIRMATION PROCEDURE, leave the vehicle for more than 1 hour.
 - Fuel filler cap is removed.
 - Fuel is refilled or drained.
 - EVAP component parts is/are removed.
- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

④ With CONSULT-III

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.

2. Make sure the following conditions are met.

FUEL LEVEL SE: 0.25 - 1.4 V

COOLAN TEMP/S: 0 - 32°C (32 - 90°F)

FUEL T/TMP SE: 0 - 35°C (32 - 95°F)

INT A/TEMP SE: More than 0°C (32°F)

If NG, turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the "FUEL LEVEL SE" meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1.

3. Turn ignition switch OFF and wait at least 10 seconds.

4. Turn ignition switch ON.

5. Select "EVAP V/S LEAK P0456/P1456" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.

Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on CONSULT-III screen, go to [EC-20, "BASIC INSPECTION : Special Repair Requirement"](#).

Which is displayed on CONSULT-III?

OK >> INSPECTION END

NG >> Go to [EC-331, "Diagnosis Procedure"](#).

4. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to [EC-331, "Component Function Check"](#).

NOTE:

Use component function check to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

P0456 EVAP CONTROL SYSTEM

< COMPONENT DIAGNOSIS >

[HR16DE]

NO >> Go to [EC-331. "Diagnosis Procedure"](#).

Component Function Check

INFOID:000000005398484

1. PERFORM COMPONENT FUNCTION CHECK

 **With GST**

CAUTION:

- Do not use compressed air, doing so may damage the EVAP system.
- Do not start engine.

• Do not exceeded 4.12 kPa (0.042 kg/cm², 0.6 psi).

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Set the pressure pump and a hose.
3. Also set a vacuum gauge via 3-way connector and a hose.
4. Turn ignition switch ON.
5. Connect GST and select Service \$08.
6. Using Service \$08 control the EVAP canister vent control valve (close).
7. Apply pressure and make sure the following conditions are satisfied.

Pressure to be applied: 2.7 kPa (0.028 kg/cm², 0.39 psi)

Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (0.004 kg/cm², 0.06 psi).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to [EC-331. "Diagnosis Procedure"](#).

2. RELEASE PRESSURE

1. Disconnect GST.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Restart engine and let it idle for 90 seconds.
5. Keep engine speed at 2,000 rpm for 30 seconds.
6. Turn ignition switch OFF.

NOTE:

For more information, refer to GST Instruction Manual.

>> INSPECTION END

Diagnosis Procedure

INFOID:000000005398485

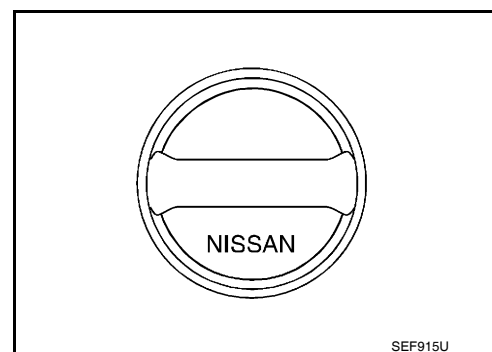
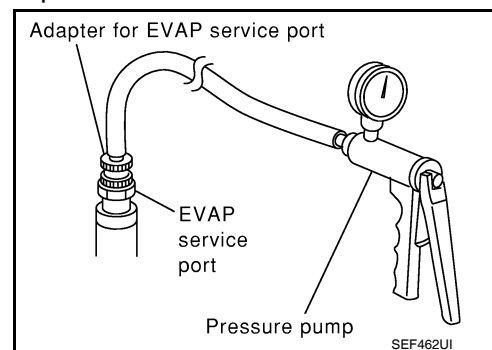
1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

P0456 EVAP CONTROL SYSTEM

[HR16DE]

< COMPONENT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Then retighten until ratcheting sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to [EC-334, "Component Inspection \(Fuel filler cap\)"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel filler cap with a genuine one.

5. CHECK FOR EVAP LEAK

Refer to [EC-498, "Inspection"](#).

Is there any leak in EVAP line?

YES >> Repair or replace.

NO >> GO TO 6.

6. CHECK DRAIN FILTER

Refer to [EC-335, "Component Inspection \(Drain filter\)"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace drain filter.

7. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly.

Refer to [EC-500, "Exploded View"](#).

- EVAP canister vent control valve.

Refer to [EC-298, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace EVAP canister vent control valve and O-ring.

8. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

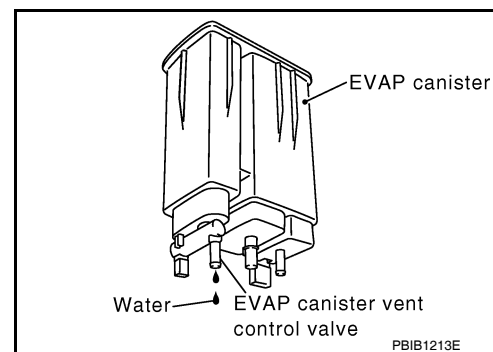
2. Check if water will drain from the EVAP canister.

Does water drain from EVAP canister?

YES >> GO TO 9.

NO-1 >> With CONSULT-III: GO TO 11.

NO-2 >> Without CONSULT-III: GO TO 12.



9. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

P0456 EVAP CONTROL SYSTEM

[HR16DE]

< COMPONENT DIAGNOSIS >

Is the inspection result normal?

- YES-1 >> With CONSULT-III: GO TO 11.
- YES-2 >> Without CONSULT-III: GO TO 12.
- NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-III screen to increase "PURG VOL CONT/V" opening to 100%.
5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

- YES >> GO TO 14.
- NO >> GO TO 13.

12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

Is the inspection result normal?

- YES >> GO TO 15.
- NO >> GO TO 13.

13. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to [EC-68, "System Description"](#).

Is the inspection result normal?

- YES >> GO TO 14.
- NO >> Repair or reconnect the hose.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-287, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 15.
- NO >> Replace EVAP canister purge volume control solenoid valve.

15. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to [EC-238, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 16.
- NO >> Replace fuel level sensor unit.

16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

P0456 EVAP CONTROL SYSTEM

[HR16DE]

< COMPONENT DIAGNOSIS >

Refer to [EC-308, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 17.

NO >> Replace EVAP control system pressure sensor.

17.CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.

Refer to [EC-68, "System Description"](#).

Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair or reconnect the hose.

18.CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 19.

19.CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to [EC-443, "Description"](#).

Is the inspection result normal?

YES >> GO TO 20.

NO >> Repair or replace hoses and tubes.

20.CHECK RECIRCULATION LINE

Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 21.

NO >> Repair or replace hose, tube or fuel filler tube.

21.CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to [EC-446, "Component Inspection \(Refueling EVAP vapor cut valve\)"](#).

Is the inspection result normal?

YES >> GO TO 22.

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

22.CHECK FUEL LEVEL SENSOR

Refer to [DI-17, "Fuel Level Sensor Signal Inspection"](#).

Is the inspection result normal?

YES >> GO TO 23.

NO >> Replace fuel level sensor unit.

23.CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

Component Inspection (Fuel filler cap)

INFOID:000000005398486

1.CHECK FUEL FILLER CAP

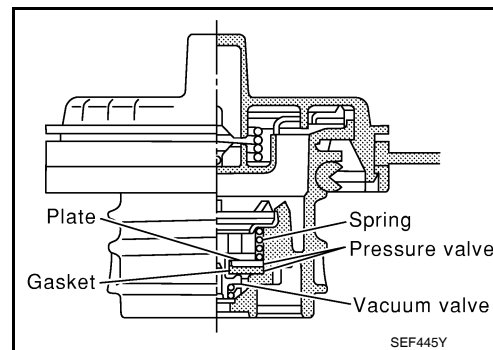
1. Turn ignition switch OFF.
2. Remove fuel filler cap.

P0456 EVAP CONTROL SYSTEM

[HR16DE]

< COMPONENT DIAGNOSIS >

3. Wipe clean valve housing.



4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.

5. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE FUEL FILLER CAP

Replace fuel filler cap.

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.

>> INSPECTION END

Component Inspection (Drain filter)

INFOID:000000005398487

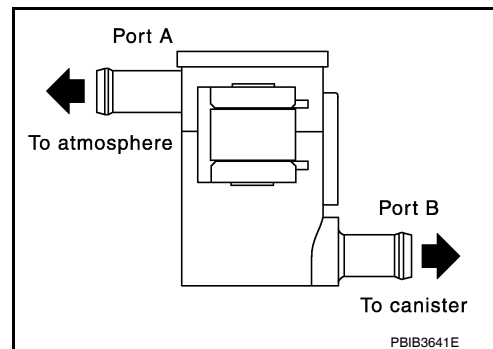
1. CHECK DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace drain filter.



P0460 FUEL LEVEL SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

P0460 FUEL LEVEL SENSOR

Description

INFOID:000000005398488

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

INFOID:000000005398489

DTC DETECTION LOGIC

NOTE:

- If DTC P0460 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0460 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to [EC-351, "DTC Logic"](#).

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	<ul style="list-style-type: none">• Harness or connectors (The CAN communication line is open or shorted)• Harness or connectors (The sensor circuit is open or shorted)• Combination meter• Fuel level sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait maximum of 2 consecutive minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to [EC-336, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398490

1. CHECK COMBINATION METER FUNCTION

Refer to [DI-14, "Trouble Diagnosis"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Refer to [DI-14, "Trouble Diagnosis"](#)

2. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

P0461 FUEL LEVEL SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

P0461 FUEL LEVEL SENSOR

Description

INFOID:000000005398491

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

INFOID:000000005398492

DTC DETECTION LOGIC

NOTE:

- If DTC P0461 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0461 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to [EC-351, "DTC Logic"](#).

Driving long distances naturally affect fuel gauge level.

This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0461	Fuel level sensor circuit range/performance	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.	<ul style="list-style-type: none">• Harness or connectors (The CAN communication line is open or shorted)• Harness or connectors (The sensor circuit is open or shorted)• Combination meter• Fuel level sensor

DTC CONFIRMATION PROCEDURE

1. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to [EC-337, "Component Function Check"](#).

Use component function check to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to [EC-338, "Diagnosis Procedure"](#).

Component Function Check

INFOID:000000005398493

1. PRECONDITIONING

WARNING:

When performing following procedure, be sure to observe the handling of the fuel. Refer to [G1-3, "General Precaution"](#).

TESTING CONDITION:

Before starting component function check, preparation of draining fuel and refilling fuel is required.

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 3.

2. PERFORM COMPONENT FUNCTION CHECK

With CONSULT-III

NOTE:

Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.

P0461 FUEL LEVEL SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

2. Release fuel pressure from fuel line, refer to [EC-496, "Inspection"](#).
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.
6. Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-III.
7. Check "FUEL LEVEL SE" output voltage and note it.
8. Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-III.
9. Touch "ON" and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10. Check "FUEL LEVEL SE" output voltage and note it.
11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
12. Check "FUEL LEVEL SE" output voltage and note it.
13. Confirm whether the voltage changes more than 0.03 V during step 7 to 10 and 10 to 12.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to [EC-338, "Diagnosis Procedure"](#).

3.PERFORM COMPONENT FUNCTION CHECK

⊗ Without CONSULT-III

NOTE:

Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line. Refer to [EC-496, "Inspection"](#).
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch ON.
6. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
7. Confirm that the fuel gauge indication varies.
8. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
9. Confirm that the fuel gauge indication varies.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to [EC-338, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005398494

1.CHECK COMBINATION METER FUNCTION

Refer to [DI-14, "Trouble Diagnosis"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Refer to [DI-14, "Trouble Diagnosis"](#)

2.CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

P0462, P0463 FUEL LEVEL SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

P0462, P0463 FUEL LEVEL SENSOR

Description

INFOID:000000005398495

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

INFOID:000000005398496

DTC DETECTION LOGIC

NOTE:

- If DTC P0462 or P0463 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0462 or P0463 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to [EC-351, "DTC Logic"](#).

This diagnosis indicates the former, to detect open or short circuit malfunction.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0462	Fuel level sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none">• Harness or connectors (The CAN communication line is open or shorted)• Harness or connectors (The sensor circuit is open or shorted)• Combination meter• Fuel level sensor
P0463	Fuel level sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 11 V and 16 V at ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-339, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398497

1. CHECK COMBINATION METER FUNCTION

Refer to [DI-14, "Trouble Diagnosis"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Refer to [DI-14, "Trouble Diagnosis"](#)

2. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

P0462, P0463 FUEL LEVEL SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

>> INSPECTION END

P0500 VSS

Description

INFOID:000000005398498

The vehicle speed signal is sent to the combination meter from the “ABS actuator and electric unit (control unit)” via the CAN communication line. The combination meter then sends a signal to the ECM via the CAN communication line.

DTC Logic

INFOID:000000005398499

DTC DETECTION LOGIC

NOTE:

- If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to [EC-351, "DTC Logic"](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500	Vehicle speed sensor	The vehicle speed signal sent to ECM is almost 0 km/h (0 MPH) even when vehicle is being driven.	<ul style="list-style-type: none"> • Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The vehicle speed signal circuit is open or shorted) • Wheel sensor • Combination meter • ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

- YES >> GO TO 2.
- NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.CHECK VEHICLE SPEED SIGNAL

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

 With CONSULT-III

1. Start engine.
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-III. The vehicle speed on CONSULT-III should exceed 10 km/h (6 mph) when rotating wheels with suitable gear position.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Go to [EC-342, "Diagnosis Procedure"](#).

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select “DATA MONITOR” mode with CONSULT-III.
2. Warm engine up to normal operating temperature.
3. Maintain the following conditions for at least 50 consecutive seconds.

CAUTION:

Always drive vehicle at a safe speed.

< COMPONENT DIAGNOSIS >

ENG SPEED	A/T: 1,900 - 6,000 rpm M/T: 2,500 - 6,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	A/T: 4.8 - 31.8 msec M/T: 3.8 - 31.8 msec
Selector lever	Except P or N position (A/T) Except Neutral position (M/T)
PW/ST SIGNAL	OFF

4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-342, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to [EC-342, "Component Function Check"](#).

Use component function check to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to [EC-342, "Diagnosis Procedure"](#).

Component Function Check

INFOID:000000005398500

1. PERFORM COMPONENT FUNCTION CHECK

 **With GST**

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed signal in Service \$01 with GST.
The vehicle speed signal on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to [EC-342, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005398501

1. CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

Refer to [BRC-20, "CONSULT-III Function \(ABS\)"](#).

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace.

2. CHECK COMBINATION METER

Refer to [DI-13, "CONSULT-III Function \(METER/M&A\)"](#).

>> INSPECTION END

P0506 ISC SYSTEM

Description

INFOID:000000005398502

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

INFOID:000000005398503

DTC DETECTION LOGIC

NOTE:

If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0506	Idle speed control system RPM lower than expected	The idle speed is less than the target idle speed by 100 rpm or more.	<ul style="list-style-type: none"> • Electric throttle control actuator • Intake air leak

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

If the target idle speed is out of the specified value, perform **EC-26, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"**, before conducting DTC Confirmation Procedure.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.
- Always perform the test at a temperature above -10°C(14°F).

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and run it for at least 1 minute at idle speed.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to **EC-343, "Diagnosis Procedure"**.
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398504

1. CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

- YES >> Discover air leak location and repair.
- NO >> GO TO 2.

2. REPLACE ECM

1. Stop engine.
2. Replace ECM.

P0506 ISC SYSTEM

< COMPONENT DIAGNOSIS >

[HR16DE]

3. Perform [EC-23. "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"](#).

>> INSPECTION END

P0507 ISC SYSTEM

Description

INFOID:000000005398505

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

INFOID:000000005398506

DTC DETECTION LOGIC

NOTE:

If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0507	Idle speed control system RPM higher than expected	The idle speed is more than the target idle speed by 200 rpm or more.	<ul style="list-style-type: none"> • Electric throttle control actuator • Intake air leak • PCV system

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

If the target idle speed is out of the specified value, perform **EC-26, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"**, before conducting DTC Confirmation Procedure.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.
- Always perform the test at a temperature above -10°C(14°F).

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and run it for at least 1 minute at idle speed.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to **EC-345, "Diagnosis Procedure"**.
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398507

1. CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace.

2. CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

P0507 ISC SYSTEM

< COMPONENT DIAGNOSIS >

[HR16DE]

Is intake air leak detected?

YES >> Discover air leak location and repair.

NO >> GO TO 3.

3.REPLACE ECM

1. Stop engine.
2. Replace ECM.
3. Perform [EC-23. "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"](#).

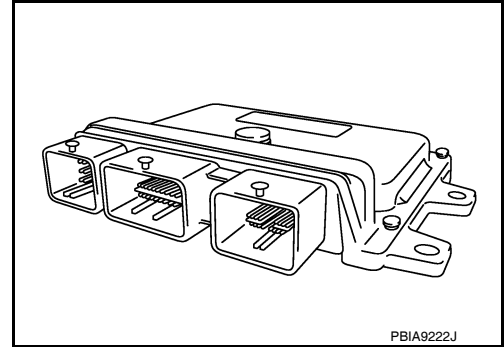
>> INSPECTION END

P0603 ECM POWER SUPPLY

Description

INFOID:000000005398508

ECM has the memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc. even when the ignition switch is turned ON.



DTC Logic

INFOID:000000005398509

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0603	Engine control module	ECM back-up RAM system does not function properly.	• ECM

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON wait at least 10 seconds.
2. Turn ignition switch OFF and wait at least 5 minutes.
3. Turn ignition switch ON, wait at least 10 seconds.
4. Repeat steps 2 and 3 for five times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-347, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398510

1. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC. Refer to "How to Erase DTC and 1st Trip DTC" in [EC-84, "Diagnosis Description"](#).
3. Perform DTC CONFIRMATION PROCEDURE. Refer to [EC-347, "DTC Logic"](#).

Is the 1st trip DTC P0603 displayed again?

- YES >> GO TO 2.
- NO >> INSPECTION END

2. REPLACE ECM

1. Replace ECM.
2. Perform [EC-23, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"](#).

P0603 ECM POWER SUPPLY

< COMPONENT DIAGNOSIS >

[HR16DE]

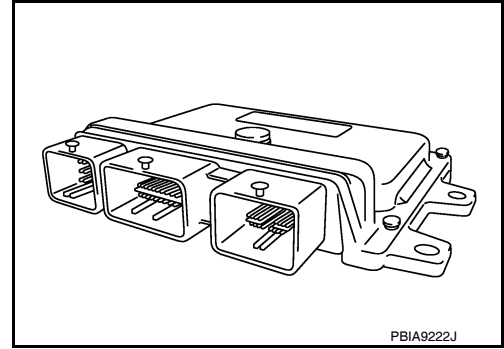
>> INSPECTION END

P0605 ECM

Description

INFOID:000000005398511

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



P0605

DTC Logic

INFOID:000000005398512

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605	Engine control module	A)	ECM calculation function is malfunctioning.	• ECM
		B)	ECM EEPROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Turn ignition switch ON.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-350, "Diagnosis Procedure"](#).
- NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-350, "Diagnosis Procedure"](#).
- NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Repeat step 2 for 32 times.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-350, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398513

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase 1st trip DTC. Refer to "How to Erase DTC and 1st Trip DTC" in [EC-84. "Diagnosis Description"](#).
3. Perform DTC CONFIRMATION PROCEDURE. Refer to [EC-349. "DTC Logic"](#).

Is the 1st trip DTC P0605 displayed again?

- YES >> GO TO 2.
- NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Perform [EC-23. "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"](#).

>> INSPECTION END

P0607 ECM

Description

INFOID:000000005398514

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:000000005398515

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0607	CAN communication bus	When detecting error during the initial diagnosis of CAN controller of ECM.	• ECM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check DTC.

Is DTC detected?

- YES >> Go to [EC-351, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398516

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC. Refer to "How to Erase DTC and 1st Trip DTC" in [EC-84, "Diagnosis Description"](#).
3. Perform DTC CONFIRMATION PROCEDURE. Refer to [EC-351, "DTC Logic"](#).
4. Check DTC.

Is the DTC P0607 displayed again?

- YES >> GO TO 2.
- NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Perform [EC-23, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"](#).

>> INSPECTION END

P0643 SENSOR POWER SUPPLY

< COMPONENT DIAGNOSIS >

[HR16DE]

P0643 SENSOR POWER SUPPLY

DTC Logic

INFOID:000000005398517

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0643	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	<ul style="list-style-type: none">• Harness or connectors (APP sensor 1 circuit is shorted.) (TP sensor circuit is shorted.) (Battery current sensor circuit is shorted.) (PSP sensor circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.]• Accelerator pedal position sensor• Throttle position sensor• Battery current sensor• Power steering pressure sensor• Camshaft position sensor (PHASE)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Go to [EC-353, "Diagnosis Procedure"](#).
NO >> INSPECTION END

P0643 SENSOR POWER SUPPLY

< COMPONENT DIAGNOSIS >

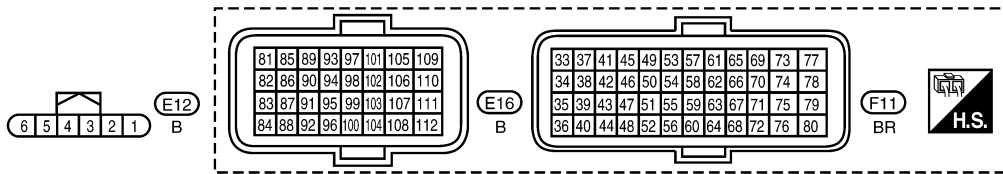
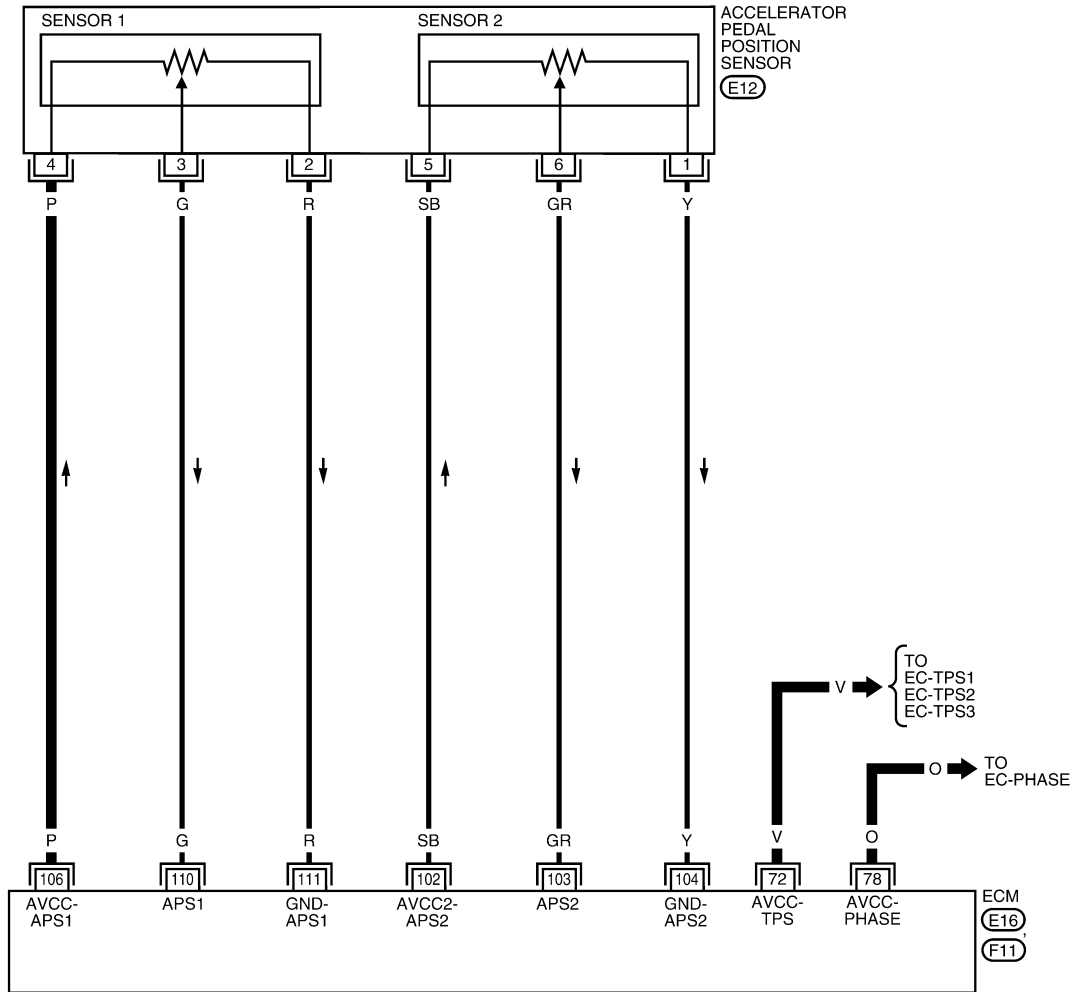
[HR16DE]

Wiring Diagram

INFOID:000000005398518

EC-SEN/PW-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA2649E

Diagnosis Procedure

INFOID:000000005398519

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

P0643 SENSOR POWER SUPPLY

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
NO >> Repair or replace ground connection.

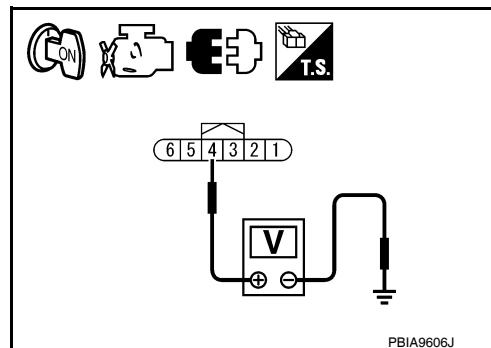
2. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E12	4	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> GO TO 7.
NO >> GO TO 3.



3. CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F11	72	Electric throttle control actuator	F7	2
	78	CMP sensor (PHASE)	F21	1
E16	106	APP sensor	E12	4

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair short to ground or short to power in harness or connectors.

4. CHECK COMPONENTS

Check the following.

- Camshaft position sensor (PHASE) (Refer to [EC-266, "Component Inspection"](#).)

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Replace camshaft position sensor (PHASE).

5. CHECK TP SENSOR

Refer to [EC-168, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 9.
NO >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform [EC-25, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement"](#).

>> INSPECTION END

7. CHECK APP SENSOR

Refer to [EC-395, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 9.
NO >> GO TO 8.

P0643 SENSOR POWER SUPPLY

< COMPONENT DIAGNOSIS >

[HR16DE]

8. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-395, "Special Repair Requirement"](#).

>> INSPECTION END

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

P0850 PNP SWITCH

< COMPONENT DIAGNOSIS >

[HR16DE]

P0850 PNP SWITCH

Description

INFOID:000000005398520

When the shift lever position is Neutral, park/neutral position (PNP) switch is ON. (M/T)
When the shift lever position is P or N, transmission range switch is ON. (A/T)
ECM detects the position because the continuity of the line (the ON signal) exists.

DTC Logic

INFOID:000000005398521

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0850	Park/neutral position switch	The signal of the park/neutral position (PNP) switch (M/T) or transmission range switch (A/T) is not changed in the process of engine starting and driving.	<ul style="list-style-type: none">• Harness or connectors [The park/neutral position (PNP) switch (M/T) or transmission range switch (A/T) circuit is open or shorted.]• Park/neutral position (PNP) switch (M/T)• Transmission range switch (A/T)

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 5.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3. CHECK PNP SWITCH (M/T) OR TRANSMISSION RANGE SWITCH (A/T) FUNCTION

ⓐ With CONSULT-III

1. Turn ignition switch ON.
2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-III. Then check the "P/N POSI SW" signal under the following conditions.

Selector lever position	Known-good signal
N or P position (A/T) Neutral position (M/T)	ON
Except above position	OFF

Is the inspection result normal?

YES >> GO TO 4.

NO >> Go to [EC-358, "Diagnosis Procedure"](#).

4. PERFORM DTC CONFIRMATION PROCEDURE

1. Select "DATA MONITOR" mode with CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Maintain the following conditions for at least 50 consecutive seconds.

CAUTION:

Always drive vehicle at a safe speed.

P0850 PNP SWITCH

< COMPONENT DIAGNOSIS >

[HR16DE]

ENG SPEED	A/T: 1,650 - 6,375 rpm M/T: 1,930 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	A/T: 3.5 - 31.8 msec M/T: 2.5 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 mph)
Selector lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to [EC-358, "Diagnosis Procedure"](#).

NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to [EC-357, "Component Function Check"](#).

NOTE:

Use component function check the overall function of the park/neutral position (PNP) switch (M/T) or transmission range switch (A/T) circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to [EC-358, "Diagnosis Procedure"](#).

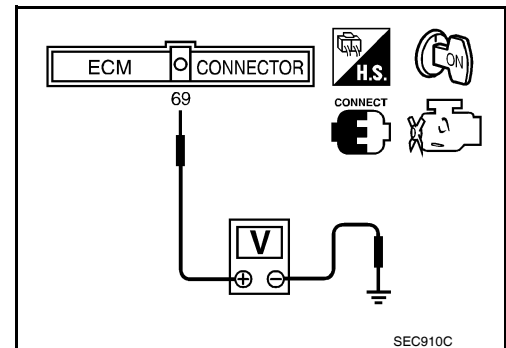
Component Function Check

INFOID:000000005398522

1.PERFORM COMPONENT FUNCTION CHECK

- Turn ignition switch ON.
- Check the voltage between ECM harness connector and ground under the following conditions.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	69 (PNP signal)	Ground	P or N (A/T) Neutral (M/T)	Approx. 0 V
			Except above	Battery voltage



Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to [EC-358, "Diagnosis Procedure"](#).

P0850 PNP SWITCH

< COMPONENT DIAGNOSIS >

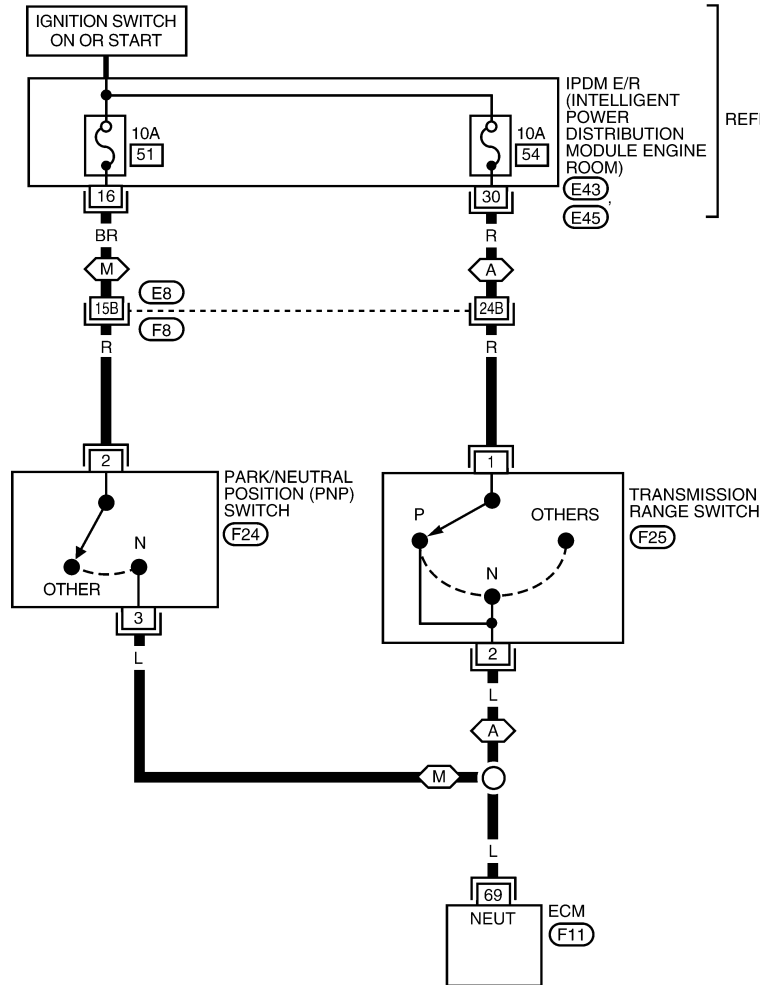
[HR16DE]

Wiring Diagram

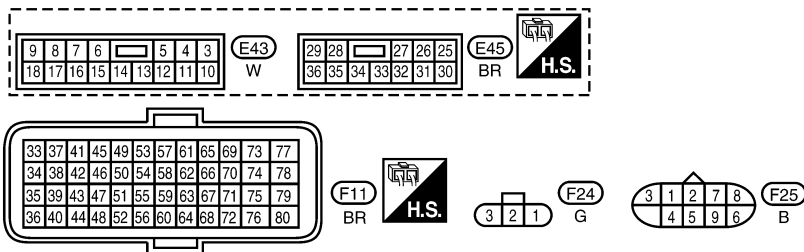
INFOID:000000005398523

EC-PNP/SW-01

- : DETECTABLE LINE FOR DTC
- : NON-DETECTABLE LINE FOR DTC
- A** : WITH A/T
- M** : WITH M/T



REFER TO "PG-POWER".



REFER TO THE FOLLOWING.

F8 - SUPER MULTIPLE JUNCTION (SMJ)

ABBWA0352GB

Diagnosis Procedure

INFOID:000000005398524

1. CHECK PNP SWITCH (M/T) OR TRANSMISSION RANGE SWITCH (A/T) POWER SUPPLY CIRCUIT

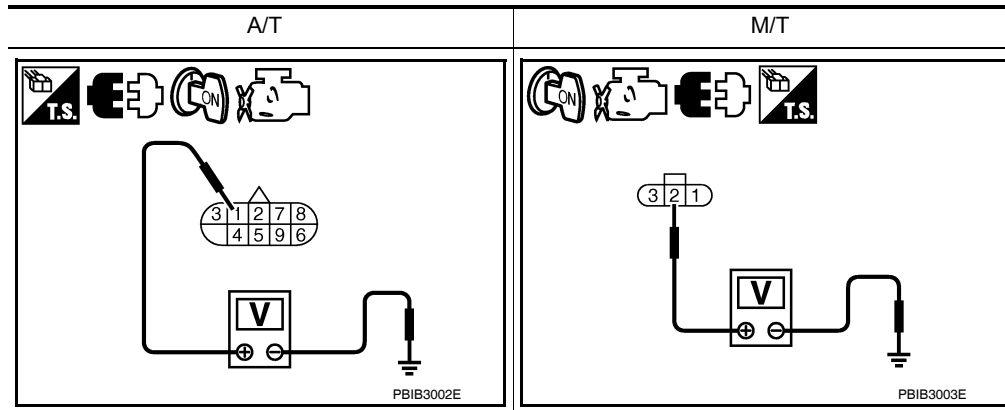
1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch (M/T) or transmission range switch (A/T) harness connector.

P0850 PNP SWITCH

[HR16DE]

< COMPONENT DIAGNOSIS >

- Turn ignition switch ON.
- Check the voltage between PNP switch (M/T) or transmission range switch (A/T) harness connector and ground.



PNP switch (M/T) Transmission range switch (A/T)		Ground	Voltage
Connector	Terminal		
F25 (A/T)	1	Ground	Battery voltage
F24 (M/T)	2		

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- IPDM E/R harness connector E43 (M/T)
- IPDM E/R harness connector E45 (A/T)
- 10 A fuse (No. 51) (M/T)
- 10 A fuse (No. 54) (A/T)
- Harness for open or short between PNP switch (M/T) or transmission range switch (A/T) and fuse

Is the inspection result normal?

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK PNP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between PNP switch (M/T) or transmission range switch (A/T) harness connector and ECM harness connector.

PNP switch (M/T) Transmission range switch (A/T)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F25 (A/T)	2	F11	69	Existed
F24 (M/T)	3			

- Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK PNP SWITCH (M/T) OR TRANSMISSION RANGE SWITCH (A/T)

P0850 PNP SWITCH

[HR16DE]

< COMPONENT DIAGNOSIS >

Refer to [AT-94. "Component Inspection"](#) (A/T) or [MT-13. "Checking"](#) (M/T).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace PNP switch (M/T) or transmission range switch (A/T).

5.CHECK INTERMITTENT INCIDENT

Refer to [EC-114. "Diagnosis Procedure"](#).

>> INSPECTION END

P1148 CLOSED LOOP CONTROL

< COMPONENT DIAGNOSIS >

[HR16DE]

P1148 CLOSED LOOP CONTROL

DTC Logic

INFOID:000000005398525

DTC DETECTION LOGIC

NOTE:

**DTC P1148 is displayed with another DTC for A/F sensor 1.
Perform the trouble diagnosis for the corresponding DTC.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1148	Closed loop control function	The closed loop control function for bank 1 does not operate even when vehicle is driving in the specified condition.	<ul style="list-style-type: none">• Harness or connectors (The A/F sensor 1 circuit is open or shorted.)• A/F sensor 1• A/F sensor 1 heater
		The closed loop control function for bank 2 does not operate even when vehicle is driving in the specified condition.	

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

P1217 ENGINE OVER TEMPERATURE

< COMPONENT DIAGNOSIS >

[HR16DE]

P1217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:000000005398526

DTC DETECTION LOGIC

NOTE:

- If DTC P1217 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1217 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to [EC-351, "DTC Logic"](#).

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217	Engine over temperature (Overheat)	<ul style="list-style-type: none">• Cooling fan does not operate properly (Overheat).• Cooling fan system does not operate properly (Overheat).• Engine coolant was not added to the system using the proper filling method.• Engine coolant is not within the specified range.	<ul style="list-style-type: none">• Harness or connectors (The cooling fan circuit is open or shorted.)• IPDM E/R (Cooling fan relay-1)• Cooling fan relays-2 and -3• Cooling fan motor• Radiator hose• Radiator• Radiator cap• Reservoir tank• Water pump• Thermostat• Water control valve

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to [CO-12, "Changing Engine Coolant"](#). Also, replace the engine oil. Refer to [LU-8, "Draining"](#) and [LU-8, "Refilling"](#).

1. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to [MA-15, "Anti-freeze Coolant Mixture Ratio"](#).
2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

DTC CONFIRMATION PROCEDURE

1. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to [EC-362, "Component Function Check"](#).

NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to [EC-363, "Diagnosis Procedure"](#).

Component Function Check

INFOID:000000005398527

1. PERFORM COMPONENT FUNCTION CHECK-I

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

P1217 ENGINE OVER TEMPERATURE

[HR16DE]

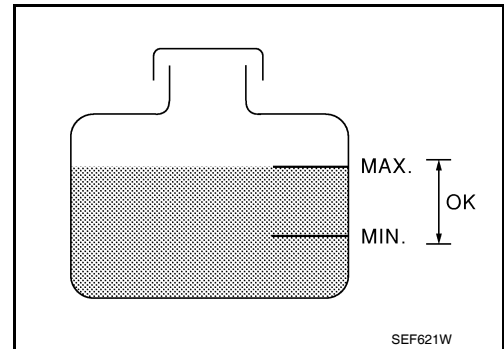
< COMPONENT DIAGNOSIS >

Check the coolant level in the reservoir tank and radiator.

Allow engine to cool before checking coolant level.

Is the coolant level in the reservoir tank and/or radiator below the proper range?

- YES >> Go to [EC-363, "Diagnosis Procedure"](#).
NO >> GO TO 2.



2.PERFORM COMPONENT FUNCTION CHECK-II

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

- YES >> Go to [EC-363, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

With CONSULT-III

1. Turn ignition switch ON.
2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-III.
3. Make sure that cooling fan motor operates at each speed (LOW/HI).

Without CONSULT-III

Perform IPDM E/R auto active test and check cooling fan motor operation. Refer to [PG-20, "Auto Active Test"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Go to [EC-363, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005398528

1.CHECK COOLING FAN OPERATION

With CONSULT-III

1. Turn ignition switch ON.
2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-III.
3. Make sure that cooling fan motor operates at each speed (LOW/HI).

Without CONSULT-III

1. Perform IPDM E/R auto active test and check cooling fan motor operation. Refer to [PG-20, "Auto Active Test"](#).
2. Make sure that cooling fan motor operates at each speed (Low/High).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Go to [EC-417, "Diagnosis Procedure"](#).

2.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to [CO-12, "Inspection"](#).

Is leakage detected?

- YES >> GO TO 3.
NO >> GO TO 4.

3.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak.

- Hose (Refer to [CO-12, "Inspection"](#).)
- Radiator (Refer to [CO-15, "Checking Radiator"](#).)
- Water pump (Refer to [CO-22, "Inspection"](#).)

>> Repair or replace malfunctioning part.

P1217 ENGINE OVER TEMPERATURE

< COMPONENT DIAGNOSIS >

[HR16DE]

4. CHECK RADIATOR CAP

Check radiator cap. Refer to [CO-15, "Checking Radiator Cap"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace radiator cap.

5. CHECK THERMOSTAT

Check thermostat. Refer to [CO-24, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace thermostat.

6. CHECK WATER CONTROL VALVE

Check water control valve. Refer to [CO-24, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace water control valve

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-163, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace engine coolant temperature sensor.

8. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, check the following.

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul style="list-style-type: none"> Blocked radiator Blocked condenser Blocked radiator grille Blocked bumper 	<ul style="list-style-type: none"> Visual 	No blocking	—
	2	<ul style="list-style-type: none"> Coolant mixture 	<ul style="list-style-type: none"> Coolant tester 	MA-15, "Anti-freeze Coolant Mixture Ratio"	
	3	<ul style="list-style-type: none"> Coolant level 	<ul style="list-style-type: none"> Visual 	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-12, "Inspection"
	4	<ul style="list-style-type: none"> Radiator cap 	<ul style="list-style-type: none"> Pressure tester 	CO-15, "Checking Radiator Cap"	
ON*2	5	<ul style="list-style-type: none"> Coolant leaks 	<ul style="list-style-type: none"> Visual 	No leaks	CO-12, "Inspection"
ON*2	6	<ul style="list-style-type: none"> Thermostat 	<ul style="list-style-type: none"> Touch the upper and lower radiator hoses 	Both hoses should be hot	CO-24, "Inspection"
ON*1	7	<ul style="list-style-type: none"> Cooling fan motor 	<ul style="list-style-type: none"> CONSULT-III 	Operating	EC-415, "Component Function Check"
OFF	8	<ul style="list-style-type: none"> Combustion gas leak 	<ul style="list-style-type: none"> Color checker chemical tester 4 Gas analyzer 	Negative	—
ON*3	9	<ul style="list-style-type: none"> Coolant temperature gauge 	<ul style="list-style-type: none"> Visual 	Gauge less than 3/4 when driving	—
		<ul style="list-style-type: none"> Coolant overflow to reservoir tank 	<ul style="list-style-type: none"> Visual 	No overflow during driving and idling	CO-12, "Inspection"
OFF*4	10	<ul style="list-style-type: none"> Coolant return from reservoir tank to radiator 	<ul style="list-style-type: none"> Visual 	Should be initial level in reservoir tank	CO-26, "Inspection"
OFF	11	<ul style="list-style-type: none"> Cylinder head 	<ul style="list-style-type: none"> Straight gauge feeler gauge 	0.1 mm (0.004 in) Maximum distortion (warping)	EM-76, "Disassembly and Assembly"
	12	<ul style="list-style-type: none"> Cylinder block and pistons 	<ul style="list-style-type: none"> Visual 	No scuffing on cylinder walls or piston	EM-97, "Inspection"

P1217 ENGINE OVER TEMPERATURE

[HR16DE]

< COMPONENT DIAGNOSIS >

- *1: Turn the ignition switch ON.
 - *2: Engine running at 3,000 rpm for 10 minutes.
 - *3: Drive at 90 km/h (56 MPH) for 30 minutes and then let idle for 10 minutes.
 - *4: After 60 minutes of cool down time.
- For more information, refer to [CO-8. "Troubleshooting Chart"](#).

>> INSPECTION END

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

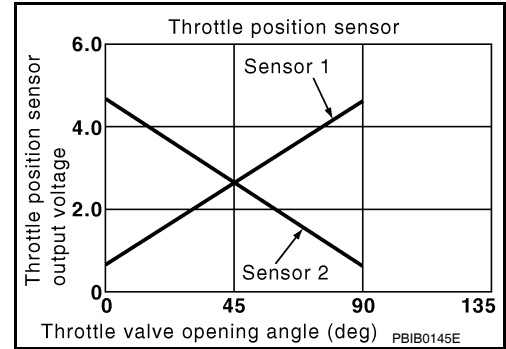
P1225 TP SENSOR

Description

INFOID:000000005398529

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic

INFOID:000000005398530

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	<ul style="list-style-type: none"> Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-366, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398531

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

P1225 TP SENSOR

[HR16DE]

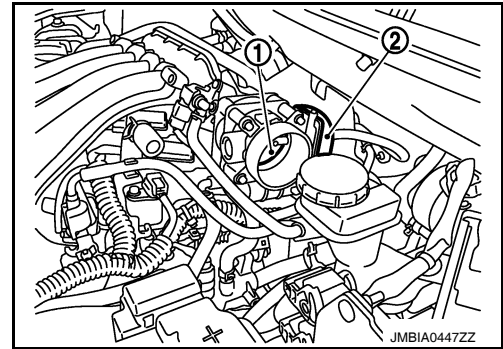
< COMPONENT DIAGNOSIS >

3. Check if foreign matter is caught between the throttle valve (1) and the housing.
 - Electric throttle control actuator (2)

Is the inspection result normal?

YES >> GO TO 2.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform [EC-367. "Special Repair Requirement"](#).

>> INSPECTION END

Special Repair Requirement

INFOID:000000005398532

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to [EC-25. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#)

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-26. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"](#)

>> END

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

P1226 TP SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

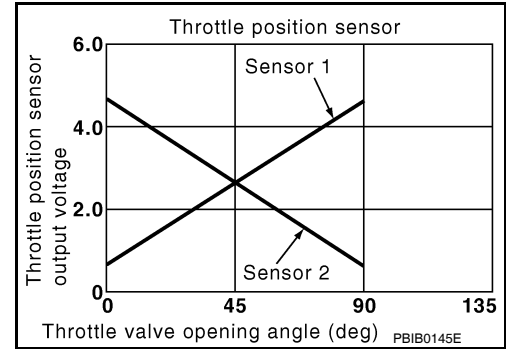
P1226 TP SENSOR

Description

INFOID:000000005398533

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic

INFOID:000000005398534

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF, wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 2 and 3 for 32 times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to [EC-368, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398535

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

P1226 TP SENSOR

[HR16DE]

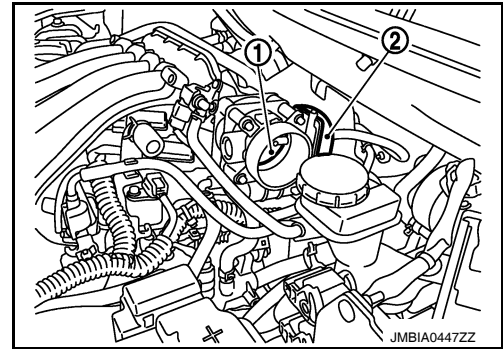
< COMPONENT DIAGNOSIS >

3. Check if foreign matter is caught between the throttle valve (1) and the housing.
 - Electric throttle control actuator (2)

Is the inspection result normal?

YES >> GO TO 2.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform [EC-369. "Special Repair Requirement"](#).

>> INSPECTION END

Special Repair Requirement

INFOID:000000005398536

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to [EC-25. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#)

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-26. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"](#)

>> END

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

P1421 COLD START CONTROL

< COMPONENT DIAGNOSIS >

[HR16DE]

P1421 COLD START CONTROL

Description

INFOID:000000005398537

ECM controls ignition timing and engine idle speed when engine is started with pre-warming up condition. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

DTC Logic

INFOID:000000005398538

DTC DETECTION LOGIC

NOTE:

If DTC P1421 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1421	Cold start emission reduction strategy monitoring	ECM does not control ignition timing and engine idle speed properly when engine is started with pre-warming up condition.	<ul style="list-style-type: none">Lack of intake air volumeFuel injection systemECM

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-III.
- Check that the "COOLAN TEMP/S" indication is between 5°C (41°F) and 36°C (97°F) (A/T) or 15°C (59°F) and 36°C (97°F) (M/T).
If "COOLAN TEMP/S" indication is within the specified value, go to the following step.
If "COOLAN TEMP/S" indication is out of the specified value, cool engine down or warm engine up and go to step 1.
- Start engine and let it idle for 5 minutes.
- Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

- YES >> Go to [EC-370, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398539

1. PERFORM IDLE AIR VOLUME LEARNING

Perform [EC-26, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"](#).

Is Idle Air Volume Learning carried out successfully?

- YES >> GO TO 2.
NO >> Follow the instruction of Idle Air Volume Learning.

2. CHECK INTAKE SYSTEM

Check for the cause of intake air volume lacking. Refer to the following.

- Crushed intake air passage

P1421 COLD START CONTROL

[HR16DE]

< COMPONENT DIAGNOSIS >

- Intake air passage clogging

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part

3. CHECK FUEL INJECTION SYSTEM FUNCTION

Perform DTC CONFIRMATION PROCEDURE for DTC P0171. Refer to [EC-223, "DTC Logic"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Go to [EC-225, "Diagnosis Procedure"](#) for DTC P0171.

4. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase 1st trip DTC. Refer to "How to Erase DTC and 1st Trip DTC" in [EC-84, "Diagnosis Description"](#).
3. Perform DTC CONFIRMATION PROCEDURE. Refer to [EC-370, "DTC Logic"](#).

Is the 1st trip DTC P1421 displayed again?

YES >> GO TO 5.

NO >> INSPECTION END

5. REPLACE ECM

1. Replace ECM.
2. Perform [EC-23, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"](#).

>> INSPECTION END

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

P1715 INPUT SPEED SENSOR (PRIMARY SPEED SENSOR)

< COMPONENT DIAGNOSIS >

[HR16DE]

P1715 INPUT SPEED SENSOR (PRIMARY SPEED SENSOR)

Description

INFOID:000000005398540

ECM receives input speed sensor signal from TCM via the CAN communication line. ECM uses this signal for engine control.

DTC Logic

INFOID:000000005398541

DTC DETECTION LOGIC

NOTE:

- If DTC P1715 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC U1000,XXXX.
- If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to [EC-257, "DTC Logic"](#).
- If DTC P1715 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to [EC-262, "DTC Logic"](#).
- If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-349, "DTC Logic"](#).
- If DTC P1715 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to [EC-351, "DTC Logic"](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715	Input speed sensor (TCM output)	Input speed sensor signal is different from the theoretical value calculated by ECM from secondary speed sensor signal and engine rpm signal.	<ul style="list-style-type: none">• Harness or connectors (The CAN communication line is open or shorted)• Harness or connectors (Input speed sensor circuit is open or shorted)• TCM

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and drive the vehicle at more than 50 km/h (31 MPH) for at least 5 seconds.

CAUTION:

Always drive vehicle at a safe speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to [EC-372, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398542

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to [AT-39, "OBD-II Diagnostic Trouble Code \(DTC\)"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.

2. REPLACE TCM

Replace TCM.

>> INSPECTION END

P1805 BRAKE SWITCH

< COMPONENT DIAGNOSIS >

[HR16DE]

P1805 BRAKE SWITCH

Description

INFOID:000000005398543

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

DTC Logic

INFOID:000000005398544

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	<ul style="list-style-type: none">• Harness or connectors (Stop lamp switch circuit is open or shorted.)• Stop lamp switch

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to [EC-374, "Diagnosis Procedure"](#).
NO >> INSPECTION END

P1805 BRAKE SWITCH

< COMPONENT DIAGNOSIS >

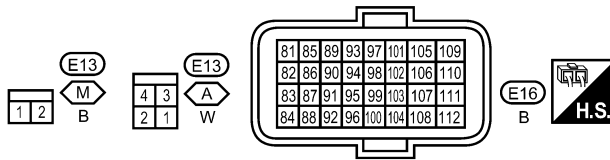
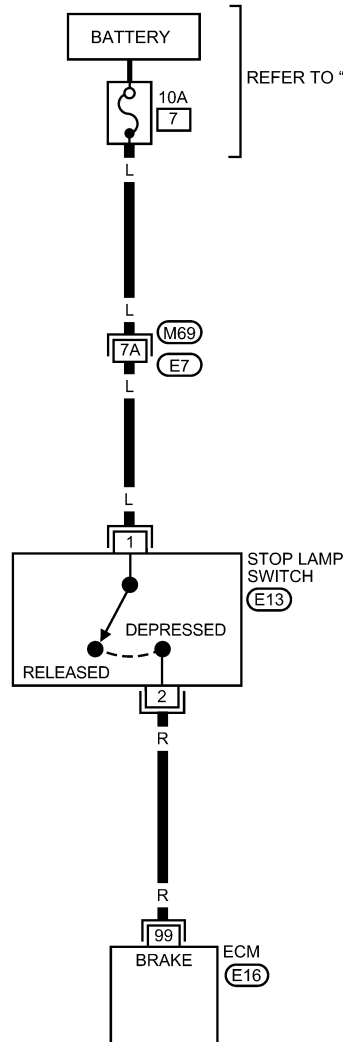
[HR16DE]

Wiring Diagram

INFOID:000000005398545

EC-BRK/SW-01

- : DETECTABLE LINE FOR DTC
- - - : NON-DETECTABLE LINE FOR DTC
- ⬡ A ⬡ : WITH A/T
- ⬡ M ⬡ : WITH M/T



REFER TO THE FOLLOWING.
 (M69) - SUPER MULTIPLE JUNCTION (SMJ)

AABWA0316GB

Diagnosis Procedure

INFOID:000000005398546

1. CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

P1805 BRAKE SWITCH

[HR16DE]

< COMPONENT DIAGNOSIS >

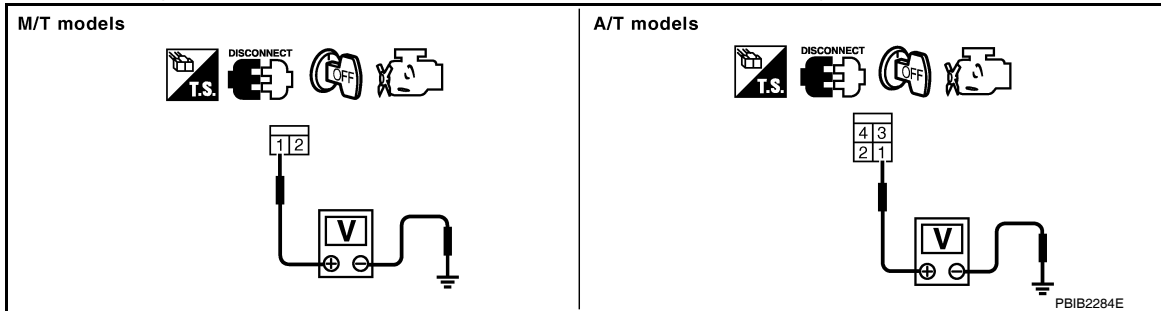
Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.



Stop lamp switch		Ground	Voltage
Connector	Terminal		
E13	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E7, M69
- 10 A fuse (No. 7)
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

ECM		Stop lamp switch		Continuity
Connector	Terminal	Connector	Terminal	
E16	99	E13	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK STOP LAMP SWITCH

Refer to [EC-376. "Component Inspection \(Stop Lamp Switch\)".](#)

Is the inspection result normal?

- YES >> GO TO 6.

P1805 BRAKE SWITCH

[HR16DE]

< COMPONENT DIAGNOSIS >

NO >> Replace stop lamp switch.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

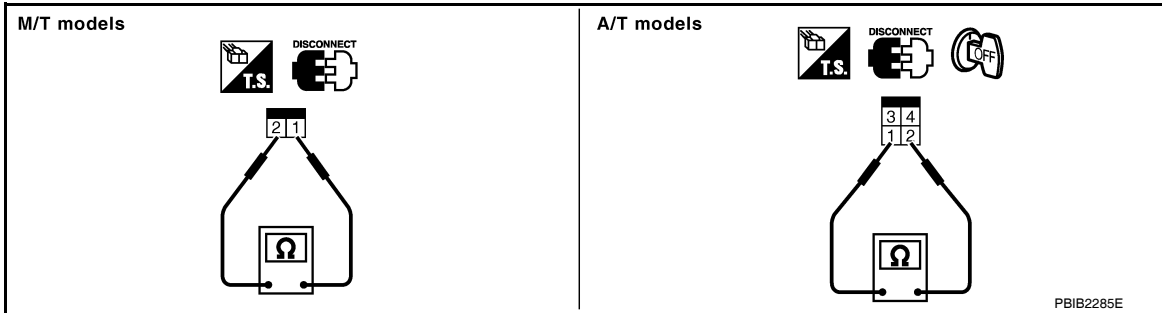
>> INSPECTION END

Component Inspection (Stop Lamp Switch)

INFOID:000000005398547

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.



Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

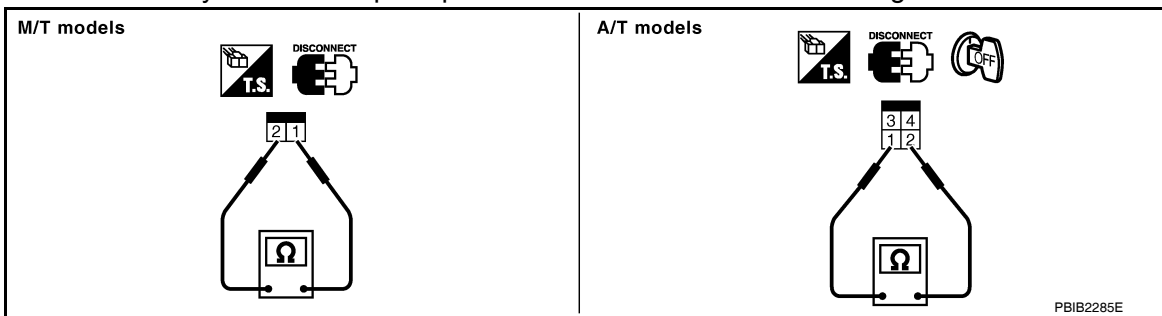
Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to [BR-6, "Inspection and Adjustment"](#).
2. Check the continuity between stop lamp switch terminals under the following conditions.



Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch.

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< COMPONENT DIAGNOSIS >

[HR16DE]

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

Description

INFOID:000000005398548

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

DTC Logic

INFOID:000000005398549

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2100	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	<ul style="list-style-type: none">• Harness or connectors (Throttle control motor relay circuit is open)• Throttle control motor relay
P2103	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	<ul style="list-style-type: none">• Harness or connectors (Throttle control motor relay circuit is shorted)• Throttle control motor relay

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V.

With DTC is detected?

P2100 >> GO TO 2.

P2103 >> GO TO 3.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to [EC-378. "Diagnosis Procedure"](#).

NO >> INSPECTION END

3. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to [EC-378. "Diagnosis Procedure"](#).

NO >> INSPECTION END

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< COMPONENT DIAGNOSIS >

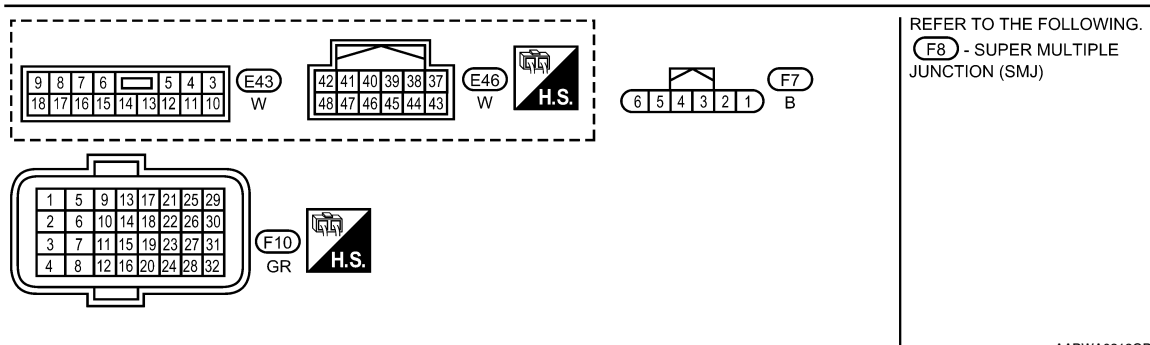
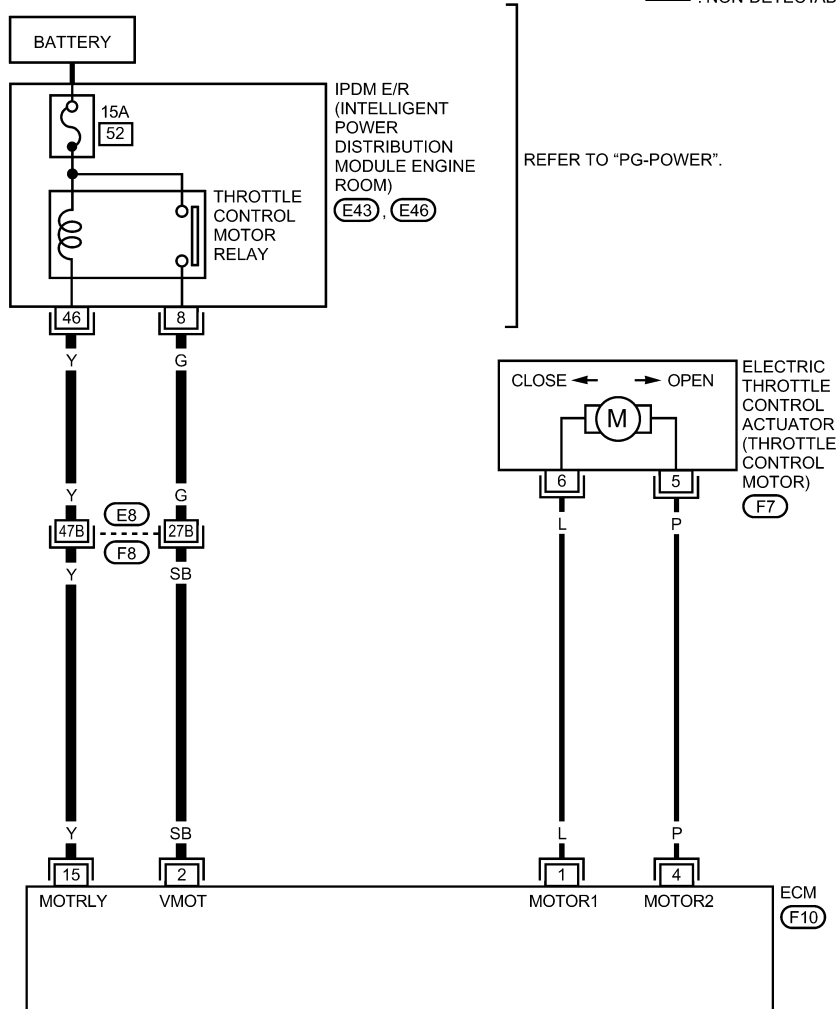
[HR16DE]

Wiring Diagram

INFOID:000000005398550

EC-ETC2-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



Diagnosis Procedure

INFOID:000000005398551

1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

[HR16DE]

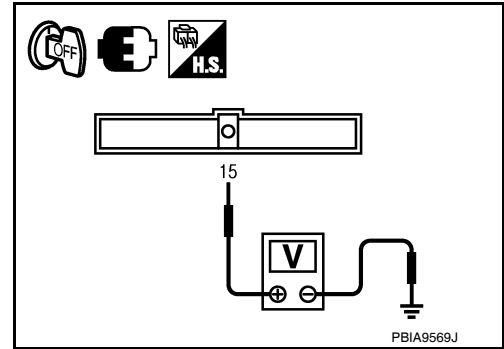
< COMPONENT DIAGNOSIS >

- Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F10	15	Ground	Battery voltage

OK or NG

- OK >> GO TO 5.
 NG >> GO TO 2.



2. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

- Disconnect ECM harness connector.
- Disconnect IPDM E/R harness connector.
- Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F10	15	E46	46	Existed

- Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUSE

- Disconnect 15 A fuse (No. 52) from IPDM E/R.
- Check 15 A fuse for blown.

Is the inspection result normal?

- YES >> GO TO 8.
 NO >> Replace 15 A fuse.

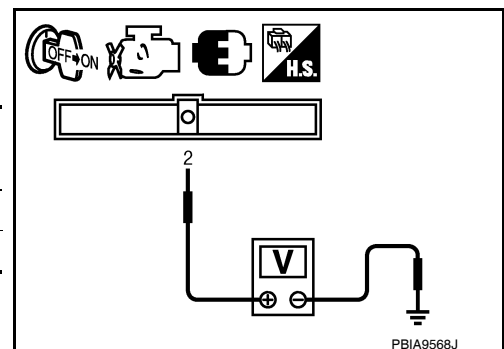
5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

Check the voltage between ECM harness connector and ground under the following conditions.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F10	2	Ground	Ignition switch: OFF	Approximately 0 V
			Ignition switch: ON	Battery voltage

OK or NG

- OK >> GO TO 8.
 NG >> GO TO 6.



6. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Disconnect IPDM E/R harness connector.

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< COMPONENT DIAGNOSIS >

[HR16DE]

4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F10	2	E43	8	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace harness or connectors.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< COMPONENT DIAGNOSIS >

[HR16DE]

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:000000005398552

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM. ECM controls the throttle valve opening angle in response to driving condition via the throttle control motor.

DTC Logic

INFOID:000000005398553

DTC DETECTION LOGIC

NOTE:

- If DTC P2101 is displayed with DTC P2100, first perform the trouble diagnosis for DTC P2100. Refer to [EC-377, "DTC Logic"](#).
- If DTC P2101 is displayed with DTC P2119, first perform the trouble diagnosis for DTC P2119. Refer to [EC-390, "DTC Logic"](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2101	Electric throttle control performance	Electric throttle control function does not operate properly.	<ul style="list-style-type: none">• Harness or connectors (Throttle control motor circuit is open or shorted)• Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

- YES >> Go to [EC-382, "Diagnosis Procedure"](#).
NO >> INSPECTION END

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< COMPONENT DIAGNOSIS >

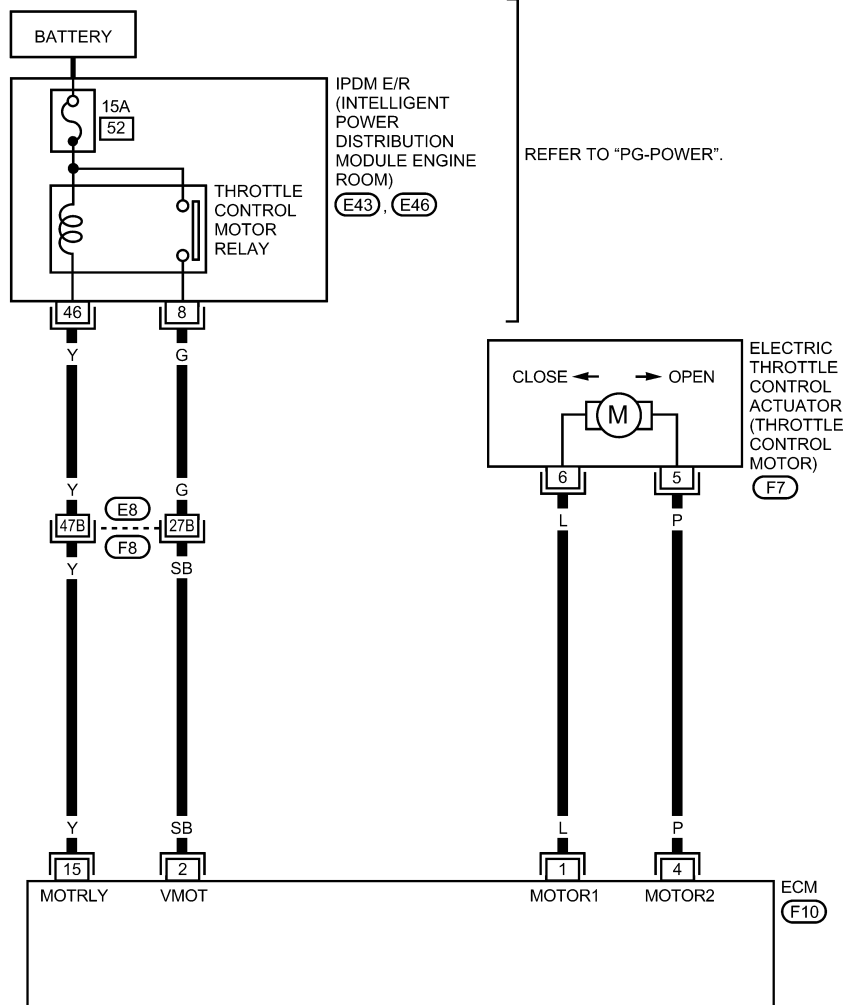
[HR16DE]

Wiring Diagram

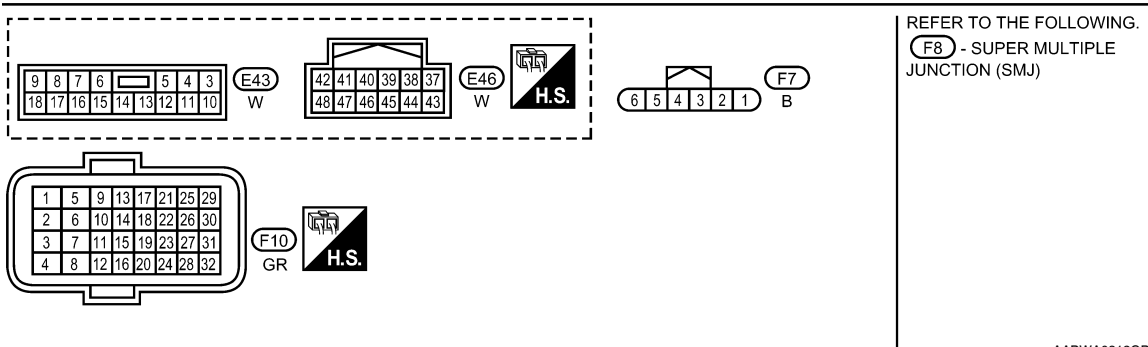
INFOID:000000005398554

EC-ETC1-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



REFER TO "PG-POWER".



REFER TO THE FOLLOWING.

(F8) - SUPER MULTIPLE JUNCTION (SMJ)

AABWA0312GB

Diagnosis Procedure

INFOID:000000005398555

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
 NO >> Repair or replace ground connection.

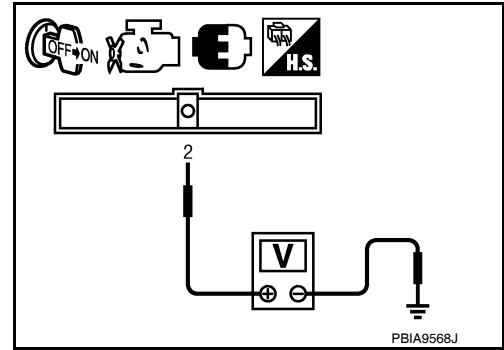
2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check the voltage between ECM harness connector and ground under the following conditions.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F10	2	Ground	Ignition switch: OFF	Approx. 0 V
			Ignition switch: ON	Battery voltage

Is the inspection result normal?

- YES >> GO TO 9.
 NO >> GO TO 3.



3.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Disconnect IPDM E/R harness connector.
- Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E46	46	F10	15	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E43	8	F10	2	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< COMPONENT DIAGNOSIS >

[HR16DE]

7. CHECK FUSE

1. Disconnect 15 A fuse (No. 52) from IPDM E/R.
2. Check 15 A fuse for blown.

Is the inspection result normal?

- YES >> GO TO 8.
NO >> Replace 15 A fuse.

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-114. "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

9. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	5	F10	1	Not existed
			4	Existed
	6		1	Existed
			4	Not existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

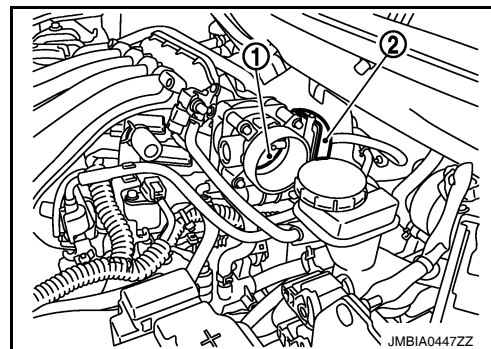
- YES >> GO TO 10.
NO >> Repair or replace.

10. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve (1) and the housing.
 - Electric throttle control actuator (2)

Is the inspection result normal?

- YES >> GO TO 11.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.



11. CHECK THROTTLE CONTROL MOTOR

Refer to [EC-385. "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 12.
NO >> GO TO 13.

12. CHECK INTERMITTENT INCIDENT

Refer to [EC-114. "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 13.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

[HR16DE]

< COMPONENT DIAGNOSIS >

NO >> Repair or replace harness or connectors.

13. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunction electric throttle control actuator.
2. Perform [EC-385. "Special Repair Requirement"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398556

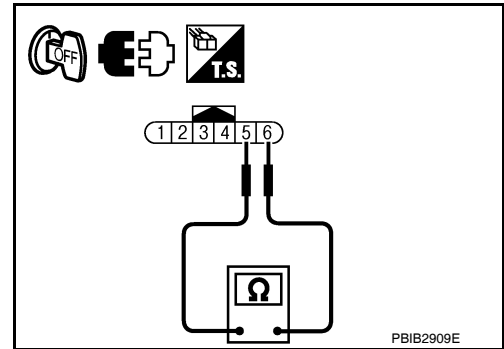
1. CHECK THROTTLE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Check the resistance between electric throttle control actuator terminals as per the following.

Terminals	Resistance
5 and 6	Approx. 1 - 15 Ω [at 25°C (77°F)]

Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 2.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform [EC-385. "Special Repair Requirement"](#).

>> INSPECTION END

Special Repair Requirement

INFOID:000000005398557

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to [EC-25. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#)

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-26. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"](#)

>> END

P2118 THROTTLE CONTROL MOTOR

< COMPONENT DIAGNOSIS >

[HR16DE]

P2118 THROTTLE CONTROL MOTOR

Description

INFOID:000000005398558

The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM. ECM controls the throttle valve opening angle in response to driving conditions via the throttle control motor.

DTC Logic

INFOID:000000005398559

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2118	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	<ul style="list-style-type: none">• Harness or connectors (Throttle control motor circuit is shorted.)• Electric throttle control actuator (Throttle control motor)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

- YES >> Go to [EC-387. "Diagnosis Procedure"](#).
NO >> INSPECTION END

P2118 THROTTLE CONTROL MOTOR

< COMPONENT DIAGNOSIS >

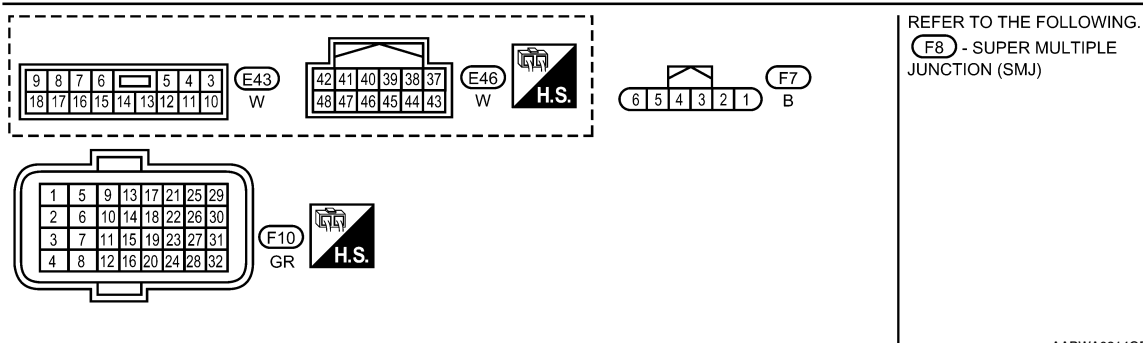
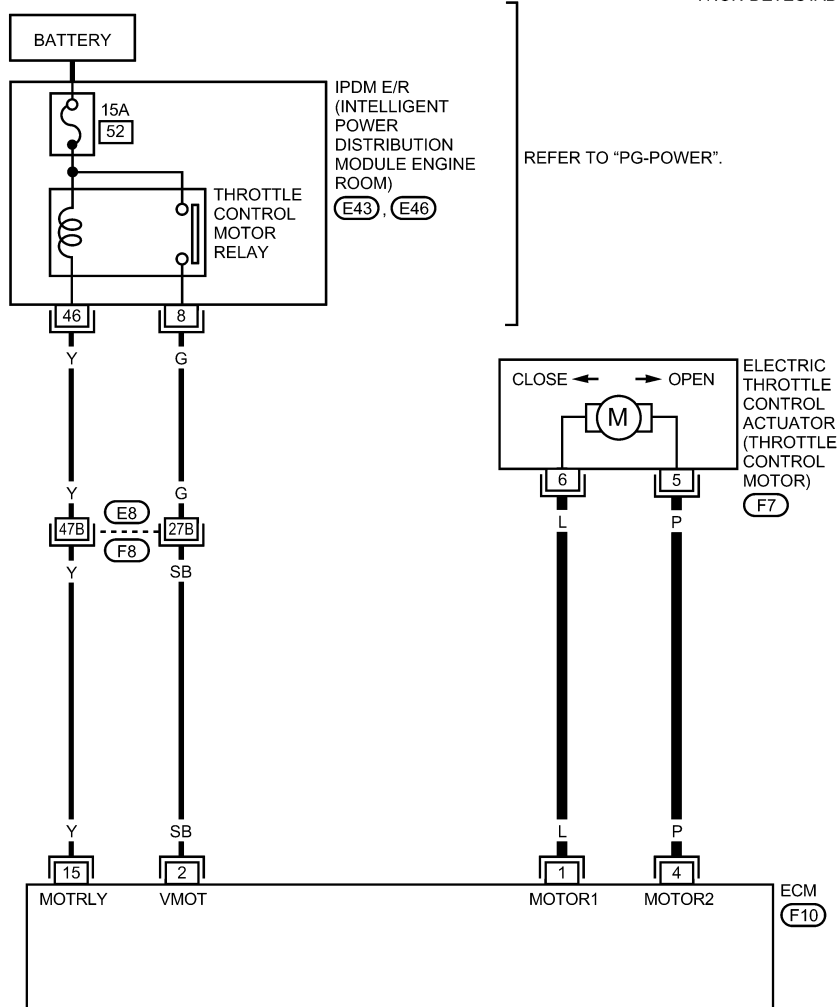
[HR16DE]

Wiring Diagram

INFOID:000000005398560

EC-ETC3-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



AABWA0314GB

Diagnosis Procedure

INFOID:000000005398561

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119. "Ground Inspection"](#).

Is the inspection result normal?

P2118 THROTTLE CONTROL MOTOR

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	5	F10	1	Not existed
			4	Existed
	6		1	Existed
			4	Not existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace.

3. CHECK THROTTLE CONTROL MOTOR

Refer to [EC-388, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 5.

4. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace harness or connectors.

5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform [EC-389, "Special Repair Requirement"](#).

>> INSPECTION END

Component Inspection

INFOID:000000005398562

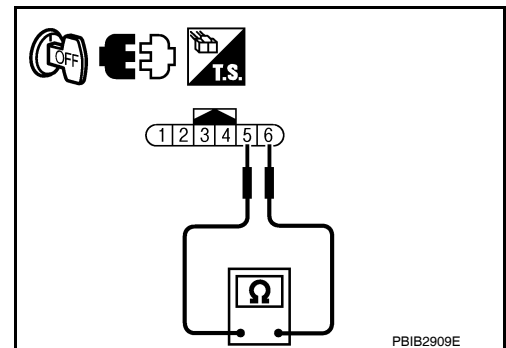
1. CHECK THROTTLE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Check the resistance between electric throttle control actuator terminals as per the following.

Terminals	Resistance
5 and 6	Approx. 1 - 15 Ω [at 25°C (77°F)]

Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 2.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

P2118 THROTTLE CONTROL MOTOR

< COMPONENT DIAGNOSIS >

[HR16DE]

1. Replace electric throttle control actuator.
2. Perform [EC-389, "Special Repair Requirement"](#).

A

>> INSPECTION END

Special Repair Requirement

INFOID:000000005398563

EC

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to [EC-25, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#)

C

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-26, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"](#)

D

E

>> END

F

G

H

I

J

K

L

M

N

O

P

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< COMPONENT DIAGNOSIS >

[HR16DE]

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

INFOID:000000005398564

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The throttle position sensor detects the throttle valve position, and feeds the voltage signal to the ECM. The ECM judges the current opening angle of the throttle valve and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.

DTC Logic

INFOID:000000005398565

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P2119	Electric throttle control actuator	A	Electric throttle control actuator does not function properly due to the return spring malfunction.	• Electric throttle control actuator
		B	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C	ECM detect the throttle valve is stuck open.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND B

1. Turn ignition switch ON and wait at least 1 second.
2. Set selector lever to D (A/T) or 1st (M/T) position and wait at least 3 seconds.
3. Set selector lever to P (A/T) or Neutral (M/T) position.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Set selector lever to D (A/T) or 1st (M/T) position and wait at least 3 seconds.
7. Set selector lever to P (A/T) or Neutral (M/T) position.
8. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
9. Check DTC.

Is DTC detected?

- YES >> Go to [EC-390. "Diagnosis Procedure"](#).
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Set selector lever to D (A/T) or 1st (M/T) position and wait at least 3 seconds.
3. Set selector lever to P (A/T) or Neutral (M/T) position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.

Is DTC detected?

- YES >> Go to [EC-390. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398566

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

[HR16DE]

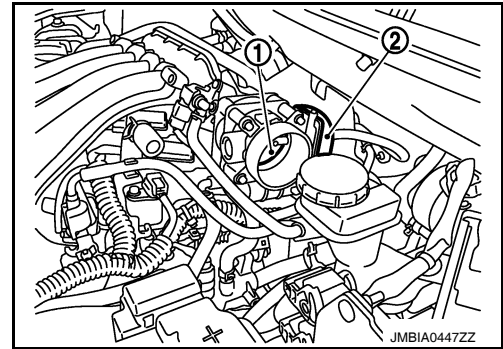
< COMPONENT DIAGNOSIS >

3. Check if foreign matter is caught between the throttle valve (1) and the housing.
 - Electric throttle control actuator (2)

Is the inspection result normal?

YES >> GO TO 2.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside.



2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform [EC-391. "Special Repair Requirement"](#).

>> INSPECTION END

Special Repair Requirement

INFOID:000000005398567

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to [EC-25. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#)

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-26. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"](#)

>> END

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

P2122, P2123 APP SENSOR

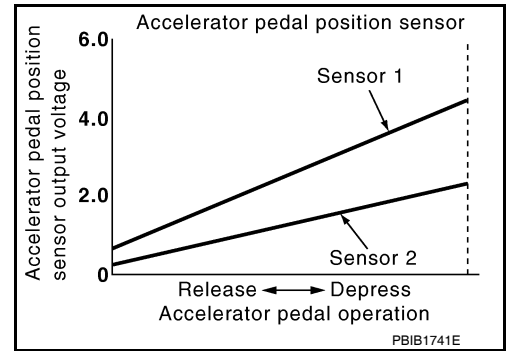
Description

INFOID:000000005398568

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



DTC Logic

INFOID:000000005398569

DTC DETECTION LOGIC

NOTE:

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-352, "DTC Logic"](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)
P2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Go to [EC-393, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

P2122, P2123 APP SENSOR



< COMPONENT DIAGNOSIS >

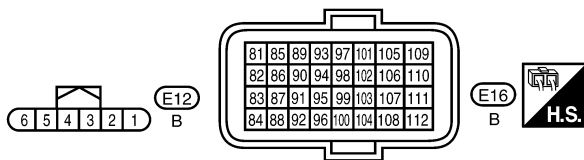
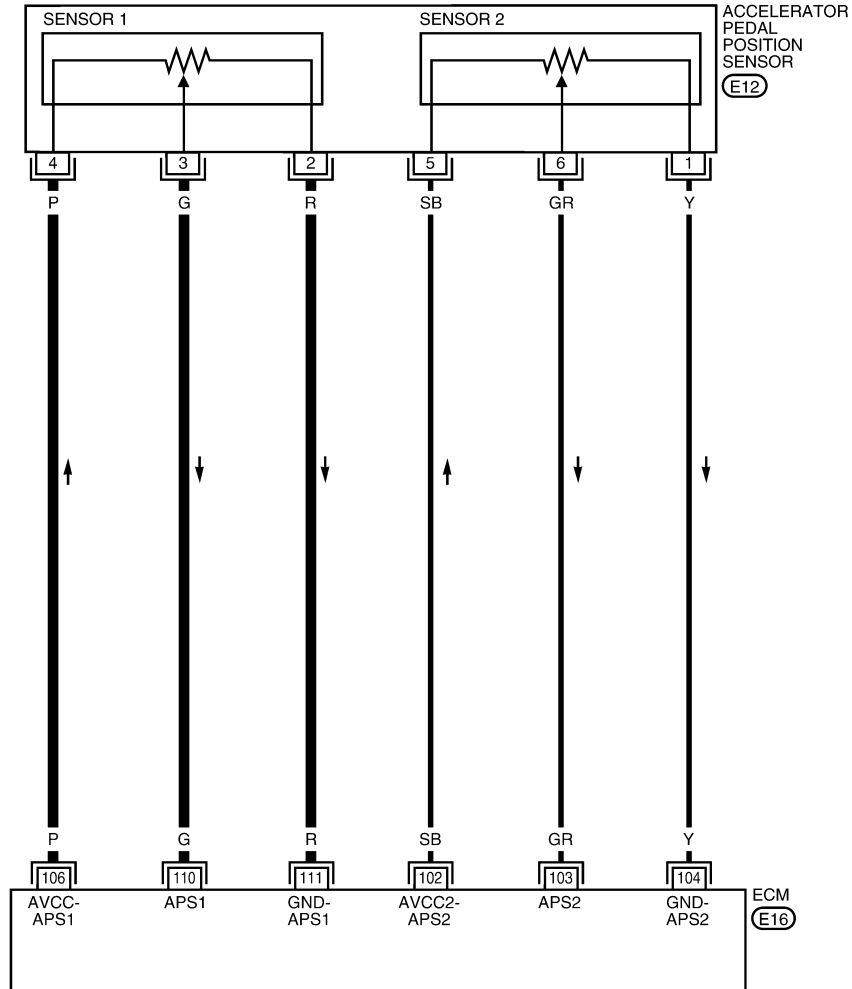
[HR16DE]

Wiring Diagram

INFOID:000000005398570

EC-APPS1-01

 : DETECTABLE LINE FOR DTC
 : NON-DETECTABLE LINE FOR DTC



BBWA2652E

Diagnosis Procedure

INFOID:000000005398571

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119. "Ground Inspection"](#).

Is the inspection result normal?

P2122, P2123 APP SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
NO >> Repair or replace ground connection.

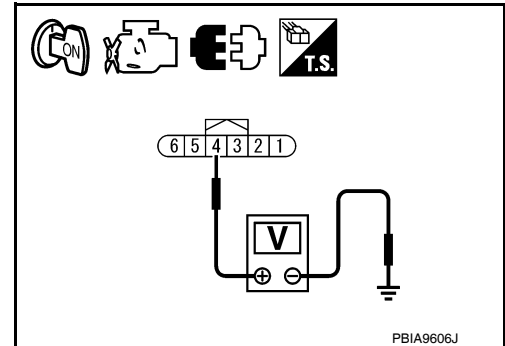
2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E12	4	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.



3.CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	2	E16	111	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	3	E16	110	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK APP SENSOR

Refer to [EC-395. "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-395. "Special Repair Requirement"](#).

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

P2122, P2123 APP SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

Refer to [EC-114. "Diagnosis Procedure"](#).

>> INSPECTION END

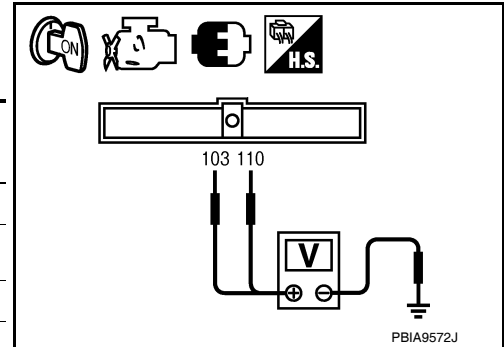
Component Inspection

INFOID:000000005398572

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
E16	110 (APP sensor 1 signal)	Ground	Fully released	0.6 - 0.9 V
	103 (APP sensor 2 signal)		Fully depressed	3.9 - 4.7 V
			Fully released	0.3 - 0.6 V
			Fully depressed	1.95 - 2.4 V



Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-395. "Special Repair Requirement"](#).

>> INSPECTION END

Special Repair Requirement

INFOID:000000005398573

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to [EC-25. "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement"](#).

>> GO TO 2.

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to [EC-25. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).

>> GO TO 3.

3. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-26. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"](#).

>> END

P2127, P2128 APP SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

P2127, P2128 APP SENSOR

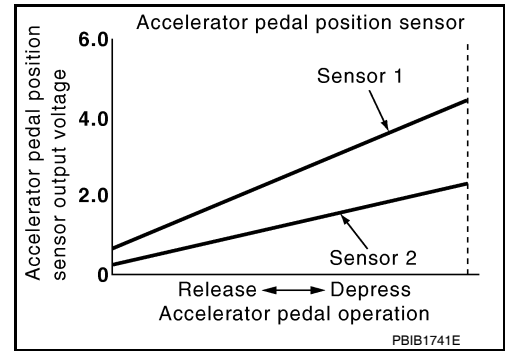
Description

INFOID:000000005398574

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



DTC Logic

INFOID:000000005398575

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (APP sensor 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor • EVAP control system pressure sensor
P2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Go to [EC-397. "Diagnosis Procedure"](#).
 NO >> INSPECTION END

P2127, P2128 APP SENSOR

< COMPONENT DIAGNOSIS >

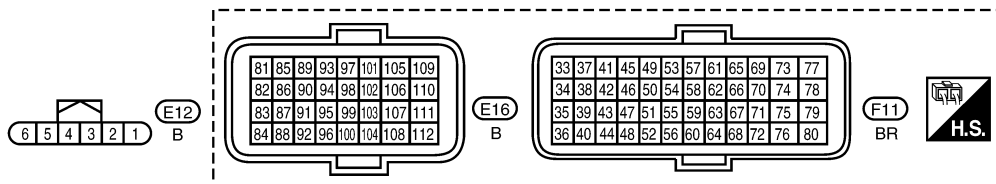
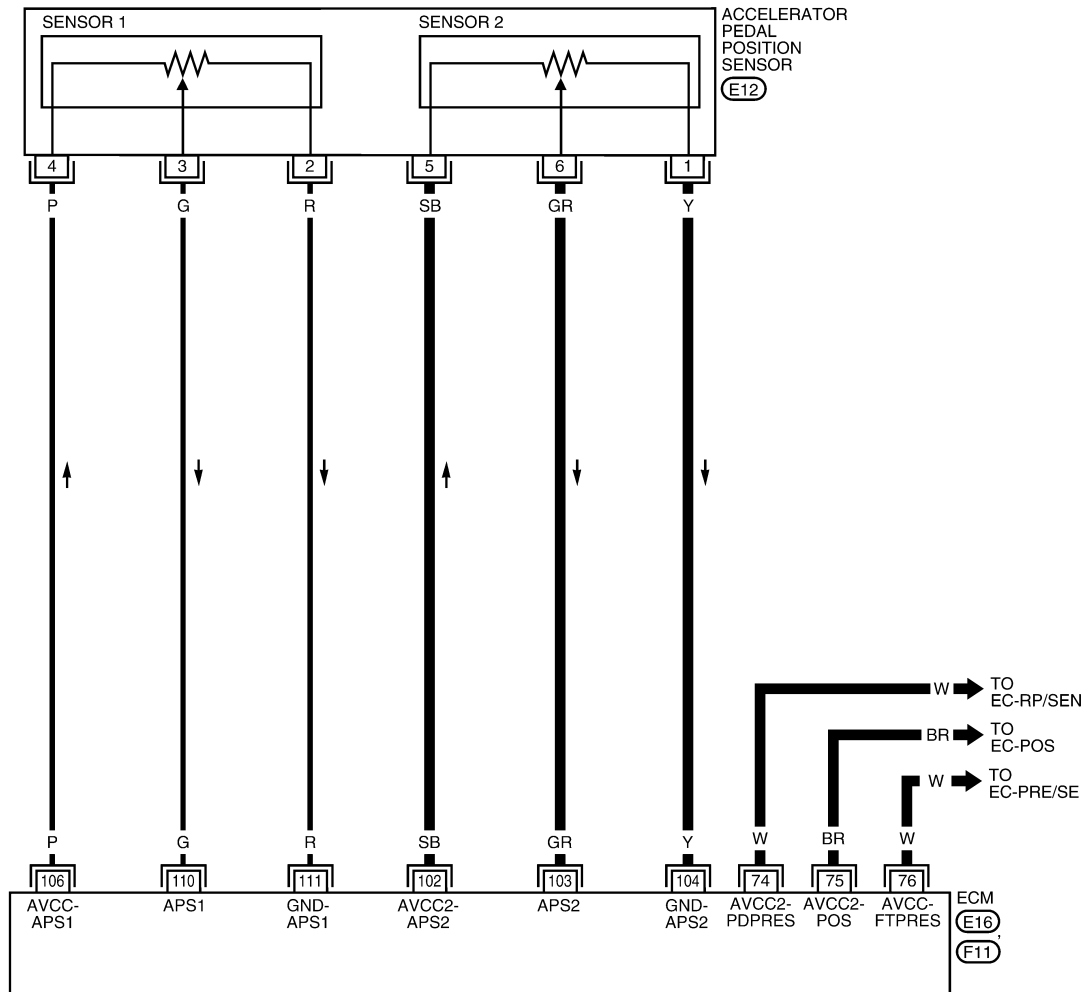
[HR16DE]

Wiring Diagram

INFOID:000000005398576

EC-APPS2-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA3074E

Diagnosis Procedure

INFOID:000000005398577

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119. "Ground Inspection"](#).

Is the inspection result normal?

P2127, P2128 APP SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
 NO >> Repair or replace ground connection.

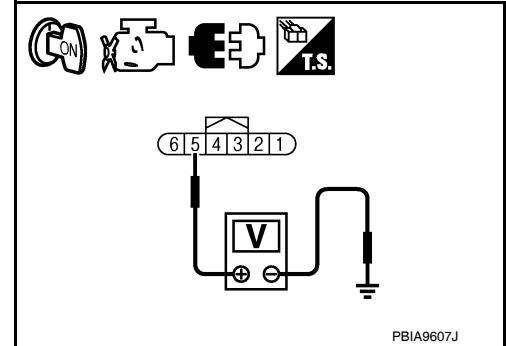
2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E12	5	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> GO TO 6.
 NO >> GO TO 3.



3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	5	E16	102	Existed

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
	76	EVAP control system pressure sensor	B104	3
E16	102	APP sensor	E12	5

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Repair short to ground or short to power in harness or connectors.

5.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to [EC-261, "Component Inspection".](#))
- EVAP control system pressure sensor (Refer to [EC-308, "Component Inspection".](#))
- Refrigerant pressure sensor (Refer to [EC-451, "Diagnosis Procedure".](#))

Is the inspection result normal?

- YES >> GO TO 10.
 NO >> Replace malfunctioning component.

6.CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

P2127, P2128 APP SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	1	E16	104	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	6	E16	103	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK APP SENSOR

Refer to [EC-399, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-400, "Special Repair Requirement"](#).

>> INSPECTION END

10. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

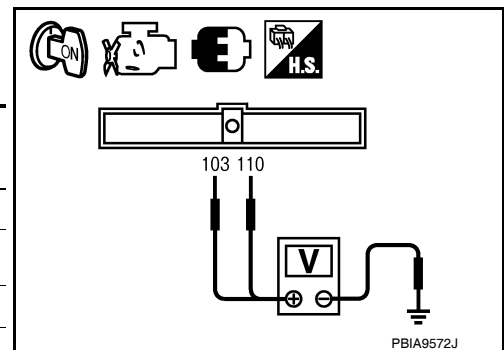
Component Inspection

INFOID:000000005398578

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage	
Connector	Terminal				
E16	110 (APP sensor 1 signal)	Ground	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	103 (APP sensor 2 signal)			Fully released	0.3 - 0.6 V
				Fully depressed	1.95 - 2.4 V



Is the inspection result normal?

P2127, P2128 APP SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-400. "Special Repair Requirement"](#).

>> INSPECTION END

Special Repair Requirement

INFOID:000000005398579

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to [EC-25. "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement"](#).

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to [EC-25. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-26. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"](#).

>> END

P2135 TP SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

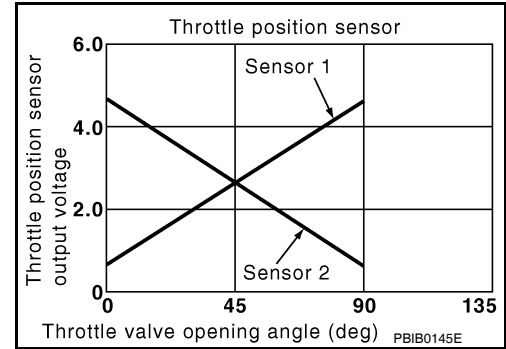
P2135 TP SENSOR

Description

INFOID:000000005398580

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic

INFOID:000000005398581

DTC DETECTION LOGIC

NOTE:

If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-352, "DTC Logic"](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	<ul style="list-style-type: none">• Harness or connector (TP sensor 1 or 2 circuit is open or shorted.)• Electric throttle control actuator (TP sensor 1 or 2)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Go to [EC-402, "Diagnosis Procedure"](#).
NO >> INSPECTION END

P2135 TP SENSOR

< COMPONENT DIAGNOSIS >

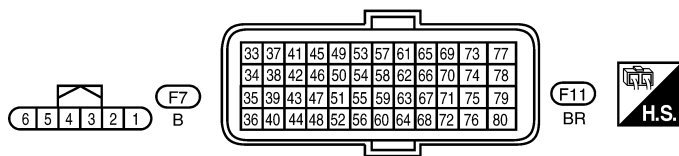
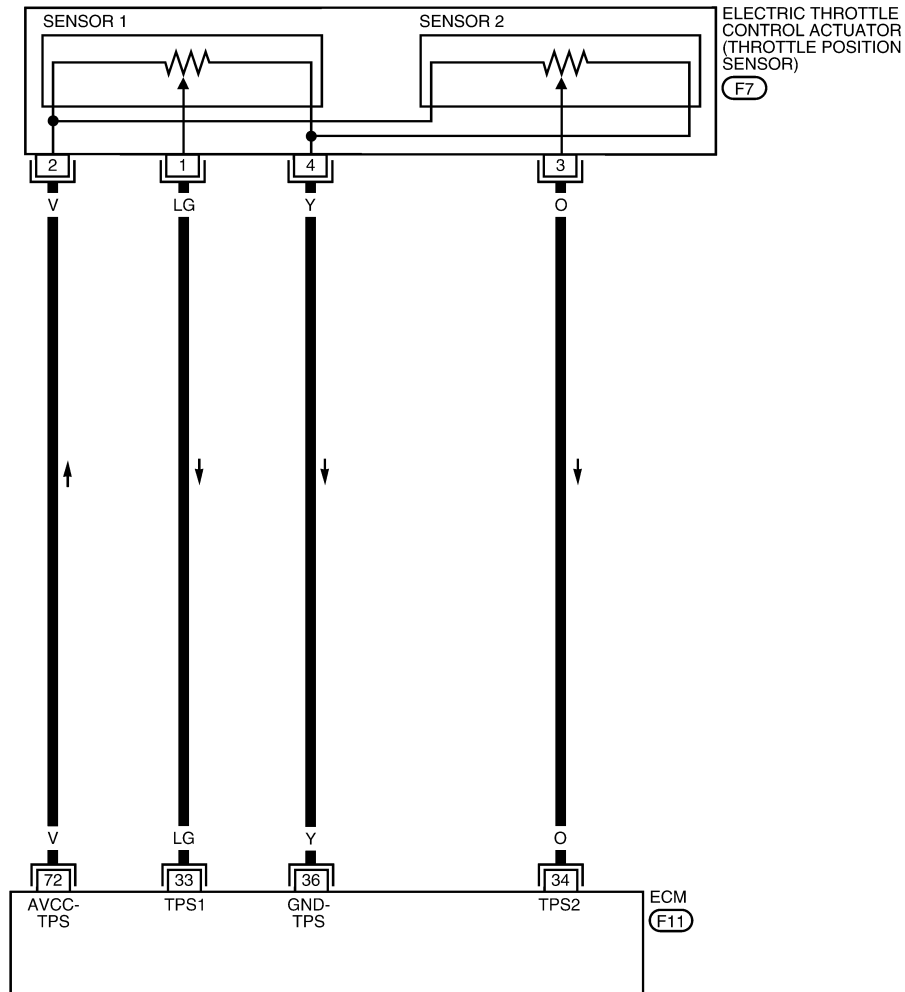
[HR16DE]

Wiring Diagram

INFOID:000000005398582

EC-TPS3-01

: DETECTABLE LINE FOR DTC
 : NON-DETECTABLE LINE FOR DTC



BBWA2657E

Diagnosis Procedure

INFOID:000000005398583

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

P2135 TP SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
 NO >> Repair or replace ground connection.

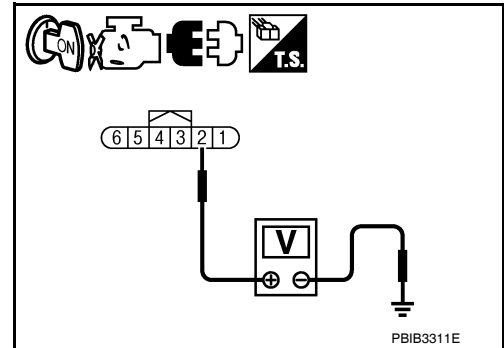
2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.
3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F7	2	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	4	F11	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	1	F11	33	Existed
	3		34	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to [EC-404. "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform [EC-404. "Special Repair Requirement"](#).

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-114. "Diagnosis Procedure"](#).

>> INSPECTION END

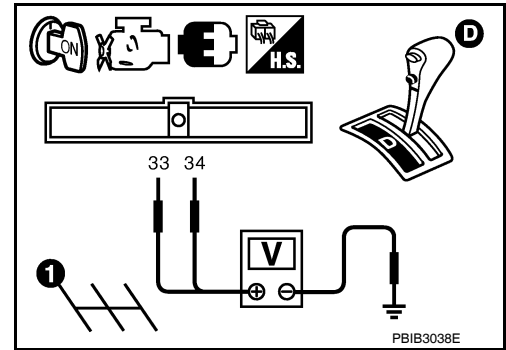
Component Inspection

INFOID:000000005398584

1. CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform [EC-404. "Special Repair Requirement"](#).
4. Turn ignition switch ON.
5. Set selector lever to D (A/T) or 1st (M/T) position.
6. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	33 (TP sensor 1 signal)	Ground	Fully released	More than 0.36V
			Fully depressed	Less than 4.75V
	34 (TP sensor 2 signal)		Fully released	Less than 4.75V
			Fully depressed	More than 0.36V



Is the inspection result normal?

- YES >> INSPECTION END
 NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform [EC-404. "Special Repair Requirement"](#).

>> INSPECTION END

Special Repair Requirement

INFOID:000000005398585

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to [EC-25. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#)

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-26. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"](#)

>> END

P2138 APP SENSOR

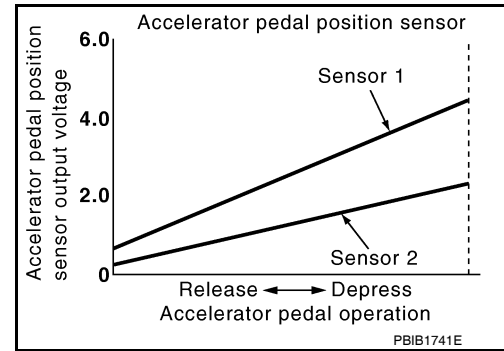
Description

INFOID:000000005398586

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



DTC Logic

INFOID:000000005398587

DTC DETECTION LOGIC

NOTE:

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-352, "DTC Logic"](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	<ul style="list-style-type: none"> • Harness or connector (APP sensor 1 or 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) (EVAP control system sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1 or 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor • EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Go to [EC-406, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

P2138 APP SENSOR

< COMPONENT DIAGNOSIS >

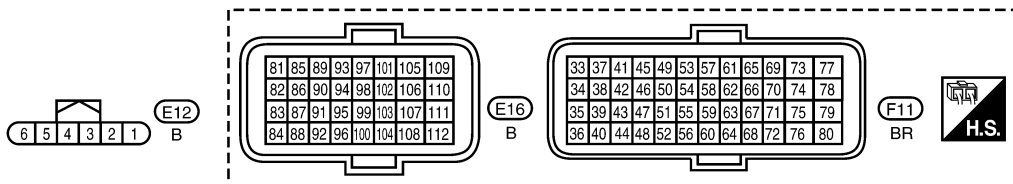
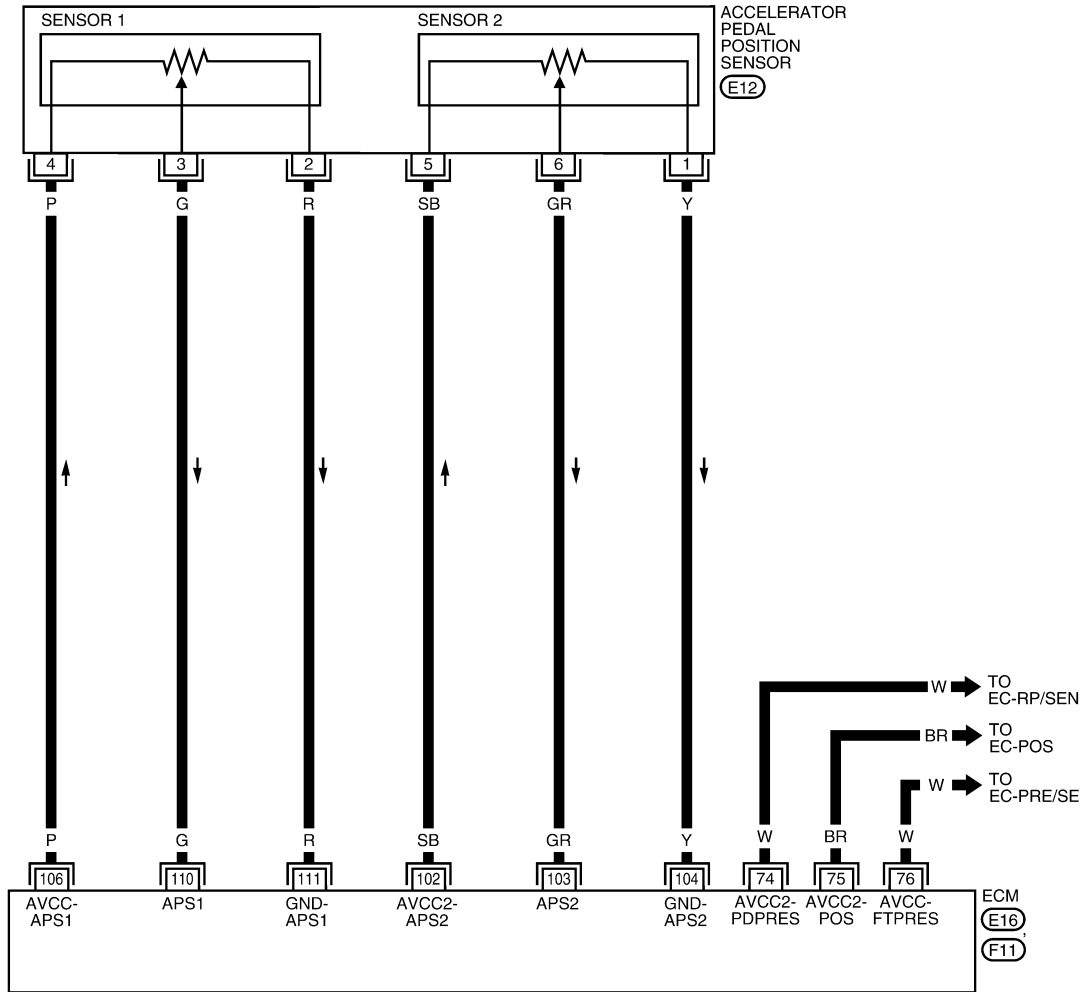
[HR16DE]

Wiring Diagram

INFOID:000000005398588

EC-APPS3-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



BBWA3075E

Diagnosis Procedure

INFOID:000000005398589

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

P2138 APP SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

- YES >> GO TO 2.
 NO >> Repair or replace ground connection.

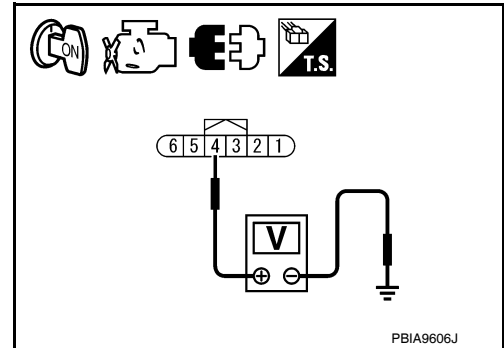
2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E12	4	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.



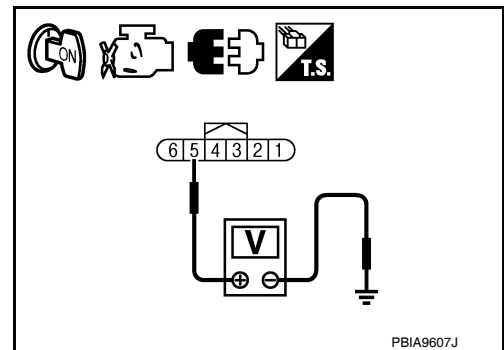
3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E12	5	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> GO TO 4.



4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	4	E16	106	Existed

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
	76	EVAP control system pressure sensor	B104	3
E16	102	APP sensor	E12	5

Is the inspection result normal?

- YES >> GO TO 6.
 NO >> Repair short to ground or short to power in harness or connectors.

< COMPONENT DIAGNOSIS >

6. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to [EC-261, "Component Inspection"](#).)
- EVAP control system pressure sensor (Refer to [EC-308, "Component Inspection"](#).)
- Refrigerant pressure sensor (Refer to [EC-451, "Diagnosis Procedure"](#).)

Is the inspection result normal?

- YES >> GO TO 11.
- NO >> Replace malfunctioning component.

7. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector as per the following.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	2	E16	111	Existed
	1		104	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector as per the following.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	3	E16	110	Existed
	6		103	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK APP SENSOR

Refer to [EC-409, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 11.
- NO >> GO TO 10.

10. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-409, "Special Repair Requirement"](#).

>> INSPECTION END

11. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

>> INSPECTION END

P2138 APP SENSOR

< COMPONENT DIAGNOSIS >

[HR16DE]

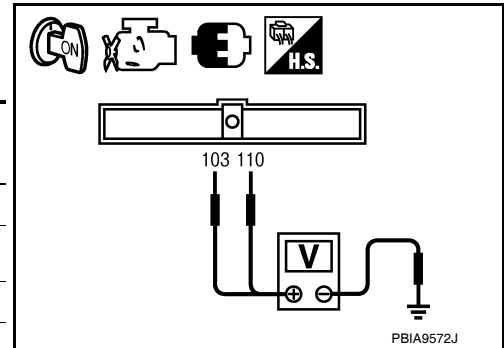
Component Inspection

INFOID:000000005398590

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
E16	110 (APP sensor 1 signal)	Ground	Fully released	0.6 - 0.9 V
	103 (APP sensor 2 signal)		Fully depressed	3.9 - 4.7 V
			Fully released	0.3 - 0.6 V
			Fully depressed	1.95 - 2.4 V



Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 2.

2. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-409, "Special Repair Requirement"](#).

>> INSPECTION END

Special Repair Requirement

INFOID:000000005398591

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to [EC-25, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement"](#).

>> GO TO 2.

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to [EC-25, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).

>> GO TO 3.

3. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-26, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"](#).

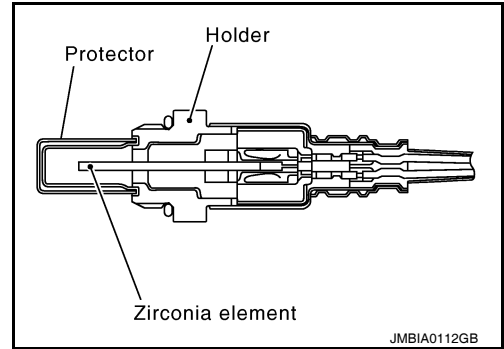
>> END

P2A00 A/F SENSOR 1

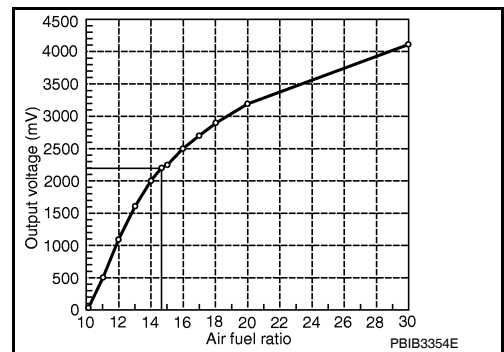
Description

INFOID:000000005398592

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element. The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range. The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



DTC Logic

INFOID:000000005398593

DTC DETECTION LOGIC

To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored not to be shifted to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P2A00	Air fuel ratio (A/F) sensor 1 circuit range/performance	<ul style="list-style-type: none"> The output voltage computed by ECM from the A/F sensor 1 signal is shifted to the lean side for a specified period. The A/F signal computed by ECM from the A/F sensor 1 signal is shifted to the rich side for a specified period. 	<ul style="list-style-type: none"> A/F sensor 1 A/F sensor 1 heater Fuel pressure Fuel injector Intake air leaks

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Clear the mixture ratio self-learning value. Refer to [EC-27, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement"](#).
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
4. Let engine idle for 1 minute.
5. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.

P2A00 A/F SENSOR 1

< COMPONENT DIAGNOSIS >

[HR16DE]

6. Check 1st trip DTC.

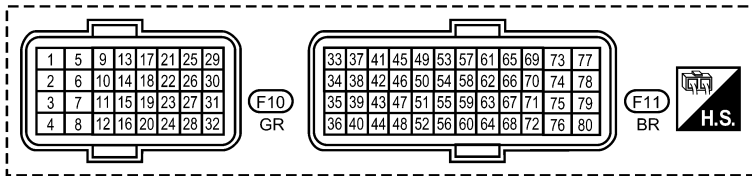
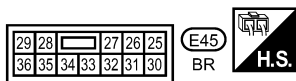
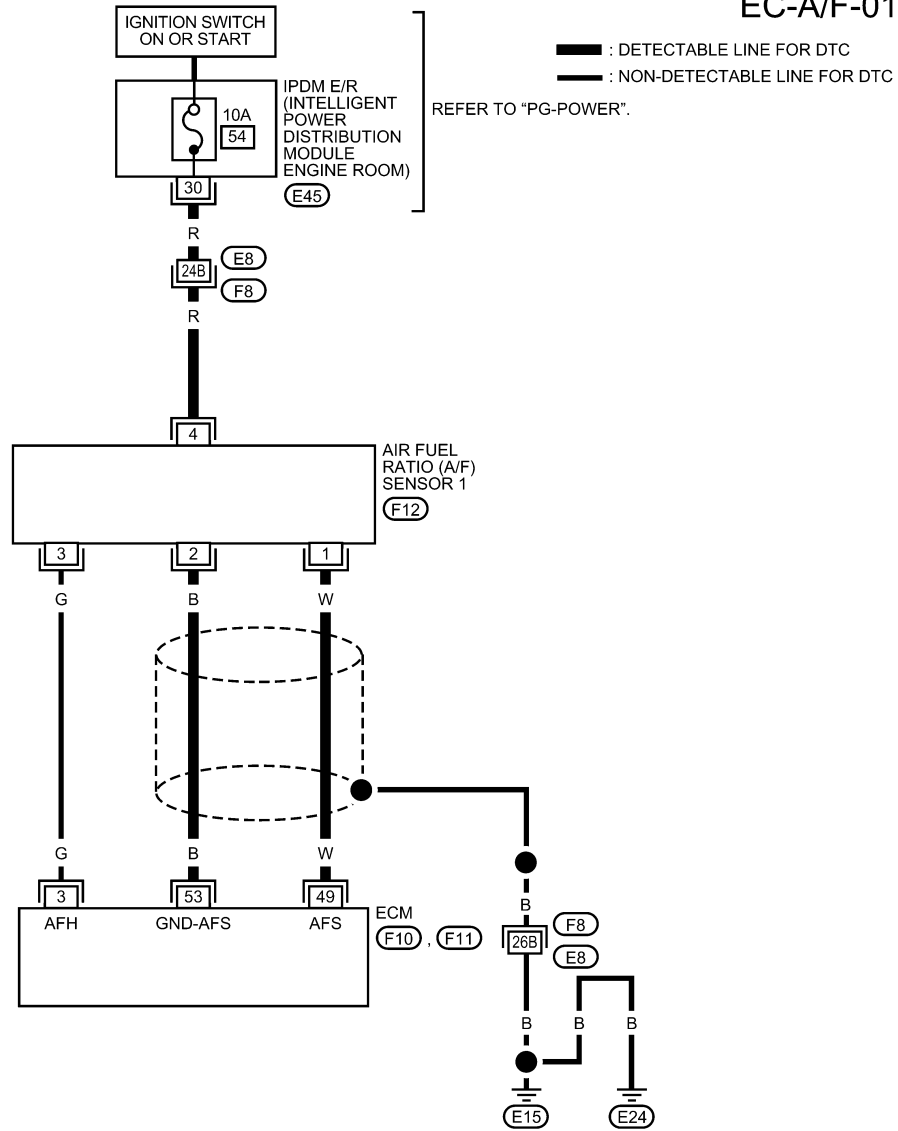
Is 1st trip DTC detected?

- YES >> Go to [EC-412. "Diagnosis Procedure"](#).
- NO >> INSPECTION END

Wiring Diagram

INFOID:000000005398594

EC-A/F-01



REFER TO THE FOLLOWING.
(F8) - SUPER MULTIPLE JUNCTION (SMJ)

AABWA0307GB

Diagnosis Procedure

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to [EC-119. "Ground Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

2. CHECK HARNESS CONNECTOR

1. Disconnect A/F sensor 1 harness connector.
2. Check harness connector for water.

Water should not exit.

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Repair or replace harness connector.

3. RETIGHTEN A/F SENSOR 1

1. Loosen and retighten the A/F sensor 1. Refer to [EM-31. "Exploded View"](#).

>> GO TO 4.

4. CHECK FOR INTAKE AIR LEAK

1. Reconnect A/F sensor 1 harness connector.
2. Start engine and run it at idle.
3. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

- YES >> GO TO 5.
- NO >> Repair or replace.

5. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to [EC-27. "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement"](#).
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

- YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to [EC-223. "DTC Logic"](#) or [EC-229. "DTC Logic"](#).
- NO >> GO TO 6.

6. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

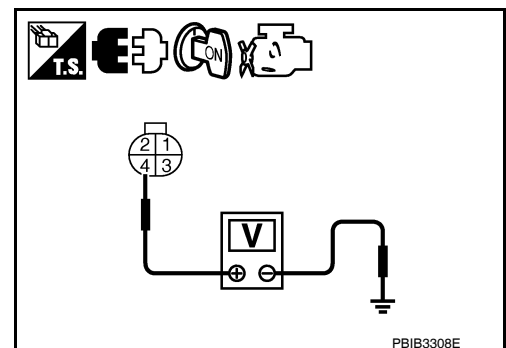
A/F sensor 1		Ground	Voltage
Connector	Terminal		
F12	4	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.



< COMPONENT DIAGNOSIS >

- Harness connectors E8, F8
- IPDM E/R harness connector E45
- 10 A fuse (No. 54)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

8.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK A/F SENSOR 1 HEATER

Refer to [EC-133, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 11.

10.CHECK INTERMITTENT INCIDENT

Perform [EC-114, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair or replace.

11.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

< COMPONENT DIAGNOSIS >

Do you have CONSULT-III?

- YES >> GO TO 12.
- NO >> GO TO 13.

12.CONFIRM A/F ADJUSTMENT DATA

Ⓟ **With CONSULT-III**

1. Turn ignition switch ON.
2. Select "A/F ADJ-B1" in "DATA MONITOR" mode with CONSULT-III.
3. Make sure that "0.000" is displayed on CONSULT-III screen.

Is "0.000" displayed?

- YES >> INSPECTION END
- NO >> GO TO 13.

13.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to [EC-27, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement"](#).

Do you have CONSULT-III?

- YES >> GO TO 14.
- NO >> INSPECTION END

14.CONFIRM A/F ADJUSTMENT DATA

Ⓟ **With CONSULT-III**

1. Turn ignition switch ON.
2. Select "A/F ADJ-B1" in "DATA MONITOR" mode with CONSULT-III.
3. Make sure that "0.000" is displayed on CONSULT-III screen.

>> INSPECTION END

COOLING FAN

< COMPONENT DIAGNOSIS >

[HR16DE]

COOLING FAN

Description

INFOID:000000005398596

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

COOLING FAN MOTOR

Models without A/C

The cooling fan operates at each speed when the current flows in the cooling fan motor as per the following.

Cooling fan Speed	Cooling fan motor terminals	
	(+)	(-)
Low (LOW)	1	3 and 4
	2	3 and 4
	1 and 2	3
	1 and 2	4
High (HI)	1 and 2	3 and 4

Models with A/C

The cooling fan operates at high (HI) speed when the current flows, and operates at low (LOW) speed when cooling fan motor and the resistor are circuited in series.

Component Function Check

INFOID:000000005398597

1. CHECK COOLING FAN FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-III.
3. Touch "LOW" and "HI" on the CONSULT-III screen.
4. Check that cooling fan operates at each speed.

Without CONSULT-III

1. Perform IPDM E/R auto active test and check cooling fan motor operation. Refer to [PG-20, "Auto Active Test"](#).
2. Check that cooling fan operates at each speed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Refer to [EC-417, "Diagnosis Procedure"](#).

COOLING FAN

< COMPONENT DIAGNOSIS >

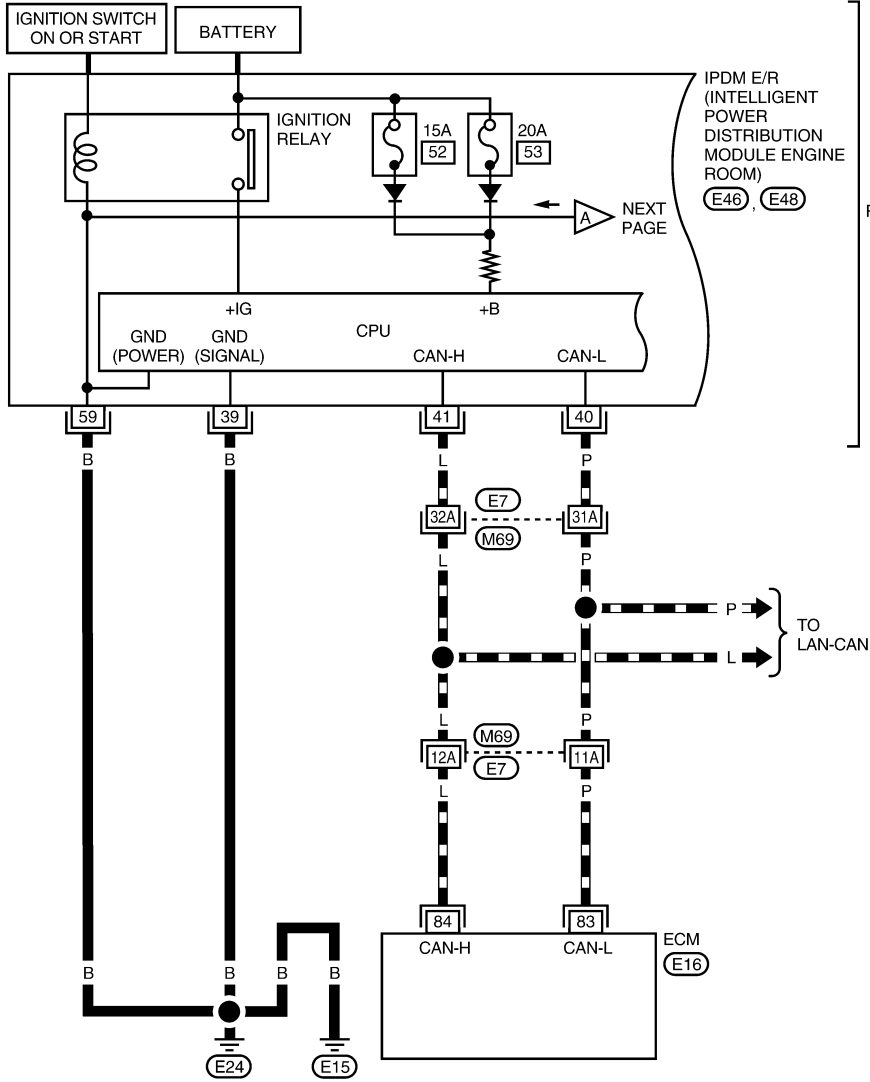
[HR16DE]

INFOID:000000005398598

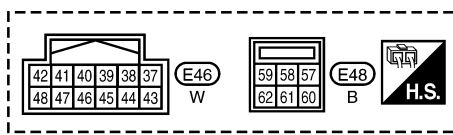
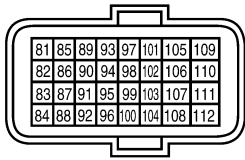
Wiring Diagram

EC-COOL/F-01

- : DETECTABLE LINE FOR DTC
- : NON-DETECTABLE LINE FOR DTC
- : DATA LINE



REFER TO "PG-POWER".



REFER TO THE FOLLOWING.

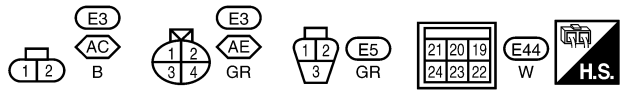
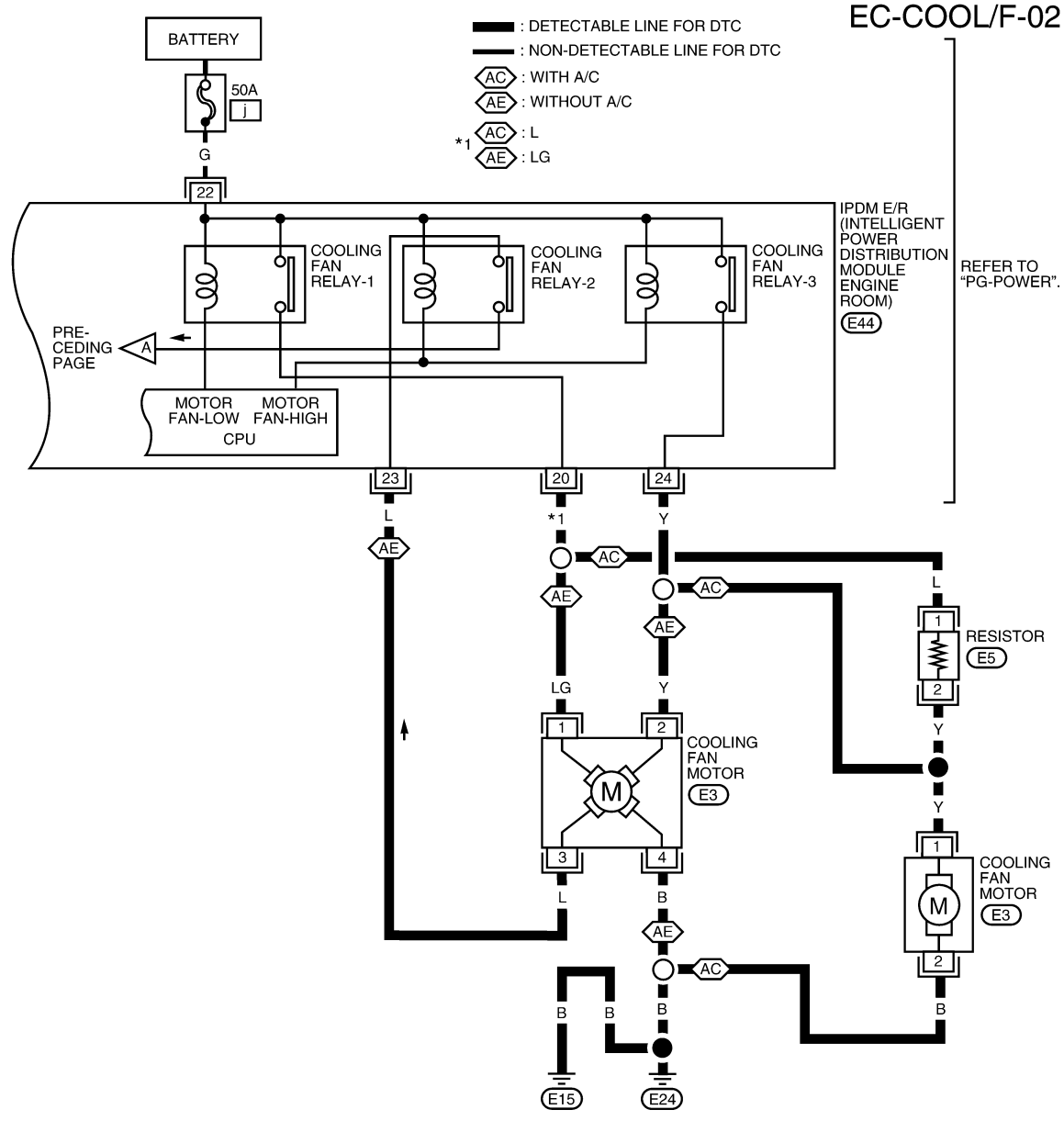
- SUPER MULTIPLE JUNCTION (SMJ)

BBWA2997E

COOLING FAN

< COMPONENT DIAGNOSIS >

[HR16DE]



Diagnosis Procedure

BBWA3001E

INFOID:000000005398599

1. CHECK IPDM E/R POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E44.

COOLING FAN

[HR16DE]

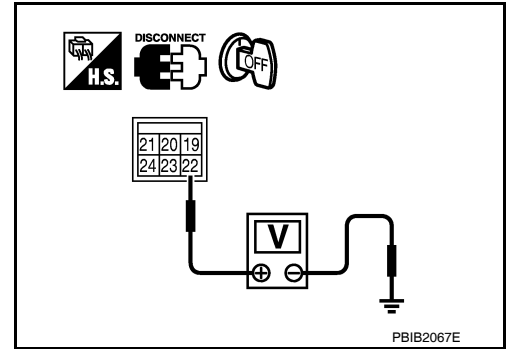
< COMPONENT DIAGNOSIS >

3. Check the voltage between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Voltage
Connector	Terminal		
E44	22	Ground	Battery voltage

OK or NG

- OK >> GO TO 3.
 NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- 50 A fusible link (letter J)
- Harness for open or short between IPDM E/R and battery

>> Repair open circuit or short to ground in harness or connectors.

3. CHECK IPDM E/R GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connectors E46 and E48.
3. Check the continuity between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Continuity
Connector	Terminal		
E46	39	Ground	Existed
E48	59		

4. Also check harness for short to power.

OK or NG

- OK (Models with A/C) >> GO TO 4.
 OK (Models without A/C) >> GO TO 6.
 NG >> Repair open circuit or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR CIRCUIT

1. Disconnect cooling fan motor harness connector.
2. Check the continuity between IPDM E/R harness connector and cooling fan motor harness connector.

IPDM E/R		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E44	20	E3	1	Existed
	24			

3. Check the continuity between cooling fan motor harness connector and ground.

Cooling fan motor		Ground	Continuity
Connector	Terminal		
E3	2	Ground	Existed

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 8.
 NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

COOLING FAN

[HR16DE]

< COMPONENT DIAGNOSIS >

- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground
- Resistor E5

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN MOTOR CIRCUIT

1. Disconnect cooling fan motor harness connector.
2. Check the continuity between IPDM E/R harness connector and cooling fan motor harness connector.

IPDM E/R		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E44	20	E3	1	Existed
	23		3	
	24		2	

3. Check the continuity between cooling fan motor harness connector and ground.

Cooling fan motor		Ground	Continuity
Connector	Terminal		
E3	4	Ground	Existed

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 8.
- NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK COOLING FAN MOTOR

Refer to [EC-419. "Component Inspection"](#).

OK or NG

- OK >> GO TO 9.
- NG >> Replace cooling fan motor.

9. CHECK INTERMITTENT INCIDENT

Perform [EC-114. "Diagnosis Procedure"](#).

OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-28. "Removal and Installation of IPDM E/R"](#).
- NG >> Repair or replace harness or connector.

Component Inspection

INFOID:000000005398600

COOLING FAN MOTOR

Model with A/C

COOLING FAN

[HR16DE]

< COMPONENT DIAGNOSIS >

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Terminals	
	(+)	(-)
Cooling fan motor	1	2

Cooling fan motor should operate.

If NG, replace cooling fan motor.

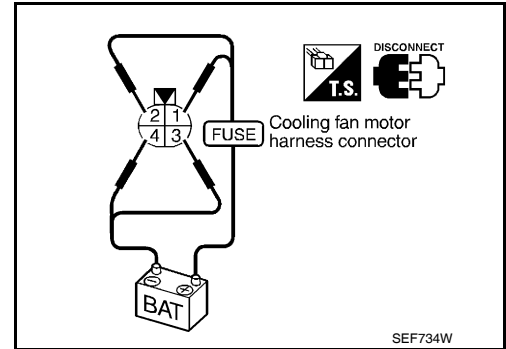
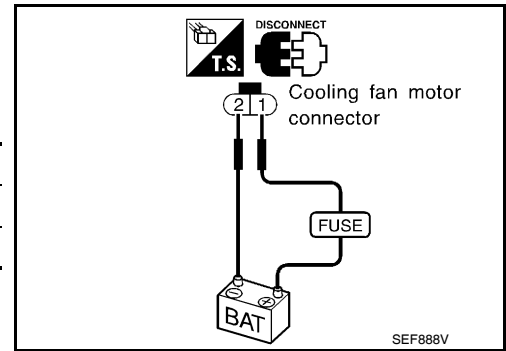
Models without A/C

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Speed	terminals	
		(+)	(-)
Cooling fan motor	Low	1	4
		2	3
	High	1 and 2	3 and 4

Cooling fan motor should operate.

If NG, replace cooling fan motor.



ELECTRICAL LOAD SIGNAL

< COMPONENT DIAGNOSIS >

[HR16DE]

ELECTRICAL LOAD SIGNAL

Description

INFOID:000000005398601

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred via the CAN communication line.

Component Function Check

INFOID:000000005398602

1. CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

1. Turn ignition switch ON.
2. Connect CONSULT-III and select "DATA MONITOR" mode.
3. Select "LOAD SIGNAL" and check indication under the following conditions.

Monitor item	Condition	Indication	
LOAD SIGNAL	Rear window defogger switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to [EC-421, "Diagnosis Procedure"](#).

2. CHECK LIGHTING SWITCH FUNCTION

Check "LOAD SIGNAL" indication under the following conditions.

Monitor item	Condition	Indication	
LOAD SIGNAL	Lighting switch	ON at 2nd position	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to [EC-421, "Diagnosis Procedure"](#).

3. CHECK HEATER FAN CONTROL SWITCH FUNCTION

Select "HEATER FAN SW" and check indication under the following conditions.

Monitor item	Condition	Indication	
HEATER FAN SW	Heater fan control switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to [EC-421, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005398603

1. INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to [EC-421, "Component Function Check"](#).

Which circuit is related to the incident?

Rear window defogger >> GO TO 2.

Headlamp >> GO TO 3.

Heater fan >> GO TO 4.

2. CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to [GW-55, "Work Flow"](#).

ELECTRICAL LOAD SIGNAL

< COMPONENT DIAGNOSIS >

[HR16DE]

>> INSPECTION END

3. CHECK HEADLAMP SYSTEM

Refer to [LT-13, "How to Perform Trouble Diagnosis"](#) (For USA) or [LT-36, "How to Perform Trouble Diagnosis"](#) (For Canada).

>> INSPECTION END

4. CHECK HEATER FAN CONTROL SYSTEM

Refer to [MTC-23, "How to Perform Trouble Diagnosis for Quick and Accurate Repair"](#).

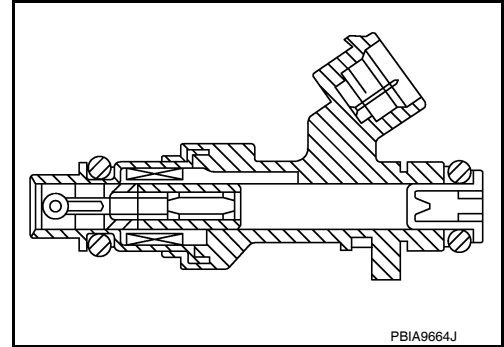
>> INSPECTION END

FUEL INJECTOR

Description

INFOID:000000005398604

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



Component Function Check

INFOID:000000005398605

1. INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.

NO >> Go to [EC-424, "Diagnosis Procedure"](#).

2. CHECK FUEL INJECTOR FUNCTION

With CONSULT-III

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-III

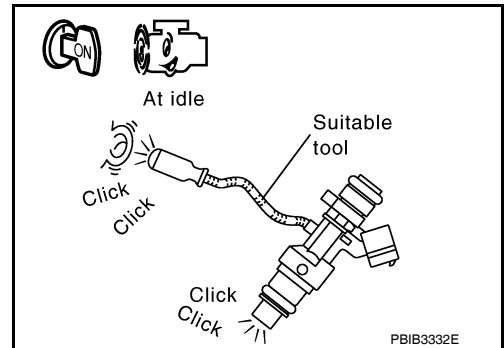
1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to [EC-424, "Diagnosis Procedure"](#).



FUEL INJECTOR

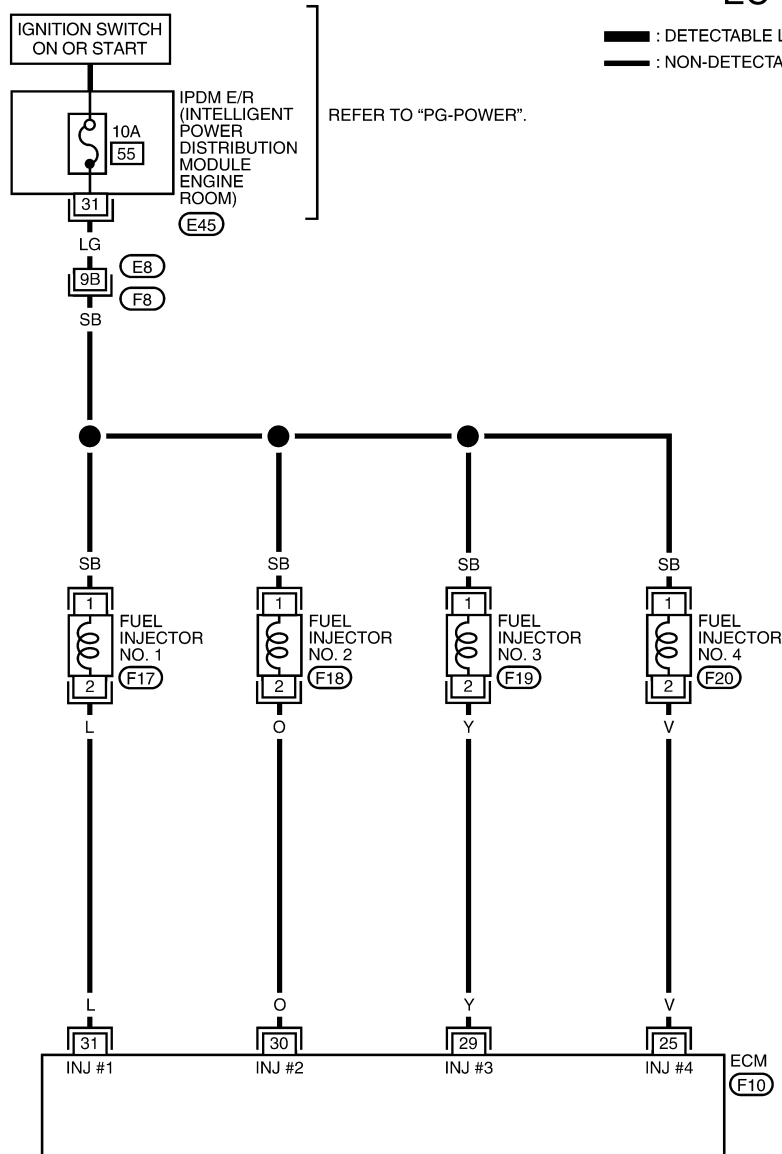
< COMPONENT DIAGNOSIS >

[HR16DE]

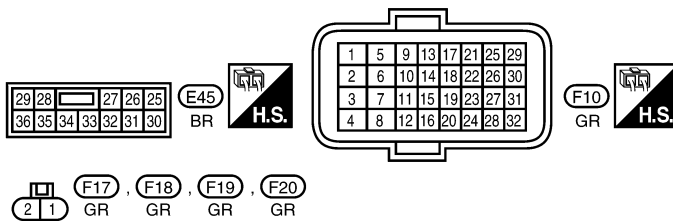
Wiring Diagram

INFOID:000000005398606

EC-INJECT-01



— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

(F8) - SUPER MULTIPLE
JUNCTION (SMJ)

BBWA3003E

Diagnosis Procedure

INFOID:000000005398607

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Turn ignition switch ON.

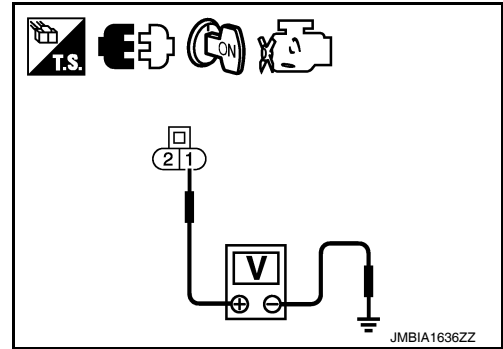
FUEL INJECTOR

[HR16DE]

< COMPONENT DIAGNOSIS >

- Check the voltage between fuel injector harness connector and ground.

Fuel injector			Ground	Voltage
Cylinder	Connector	Terminal		
1	F17	1	Ground	Battery voltage
2	F18	1		
3	F19	1		
4	F20	1		



Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R harness connector E45
- 10 A fuse (No. 55)
- Harness for open or short between fuel injector and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F17	2	F10	31	Existed
2	F18	2		30	
3	F19	2		29	
4	F20	2		25	

- Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL INJECTOR

Refer to [EC-425, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Replace malfunctioning fuel injector.

5.CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Replace IPDM E/R.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

Component Inspection

INFOID:000000005398608

1.CHECK FUEL INJECTOR

- Turn ignition switch OFF.

FUEL INJECTOR

[HR16DE]

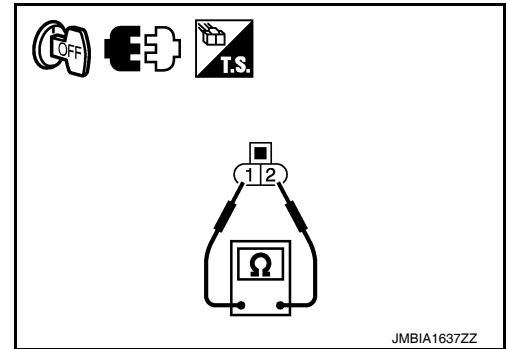
< COMPONENT DIAGNOSIS >

2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as per the following.

Terminals	Resistance
1 and 2	11.1 - 14.5 Ω [at 10 - 60°C (50 - 140°F)]

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector.



FUEL PUMP

< COMPONENT DIAGNOSIS >

[HR16DE]

FUEL PUMP

Description

INFOID:000000005398609

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓ Fuel pump
Battery	Battery voltage*		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine start ability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

Component Function Check

INFOID:000000005398610

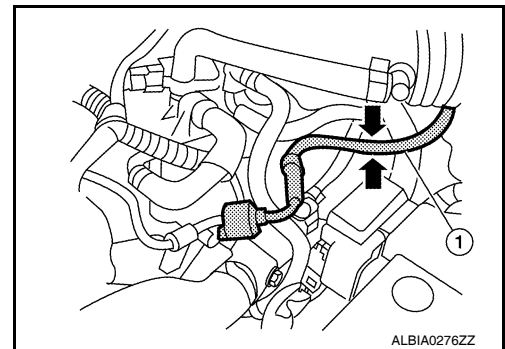
1. CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose (1) with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> [EC-428, "Diagnosis Procedure"](#).



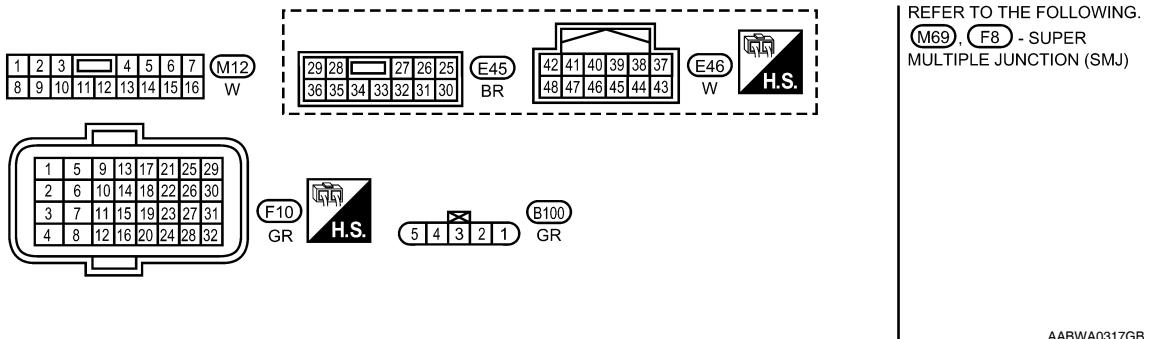
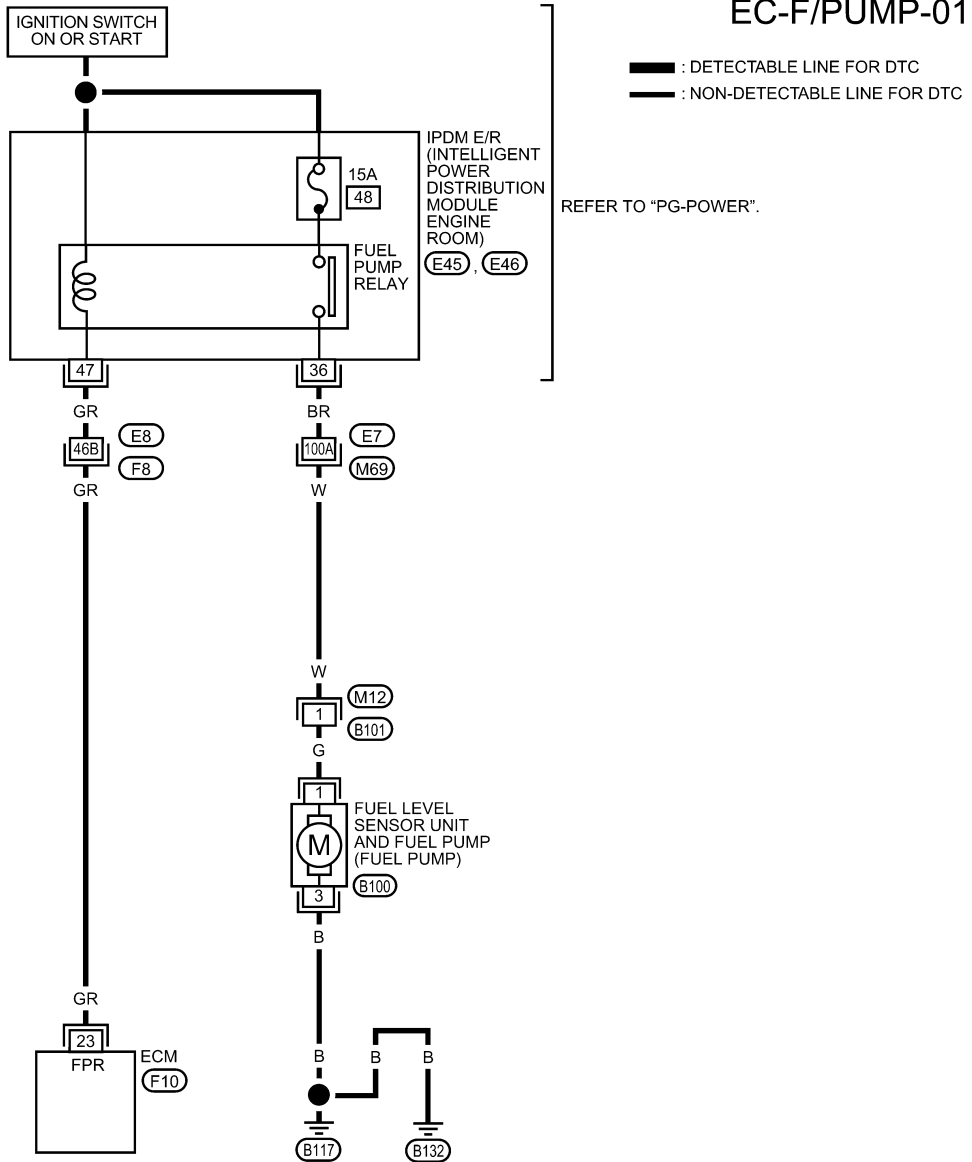
FUEL PUMP

< COMPONENT DIAGNOSIS >

[HR16DE]

INFOID:000000005398611

Wiring Diagram



AABWA0317GB

Diagnosis Procedure

INFOID:000000005398612

1. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.

FUEL PUMP

[HR16DE]

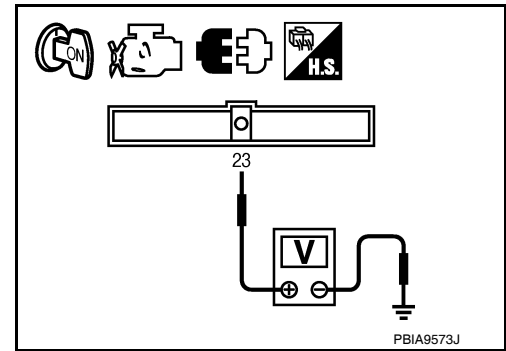
< COMPONENT DIAGNOSIS >

- Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F10	23	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 2.



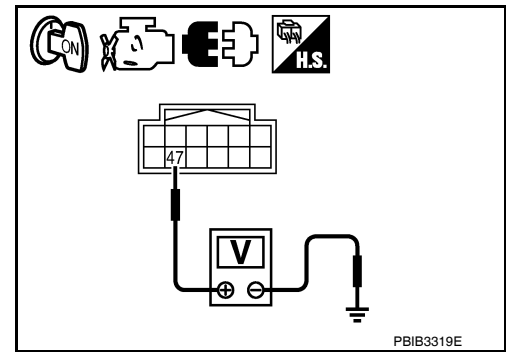
2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

- Turn ignition switch OFF.
- Disconnect IDPDM E/R harness connector E46.
- Turn ignition switch ON.
- Check the voltage between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Voltage
Connector	Terminal		
E46	47	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 10.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness or connectors E8, F8.
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

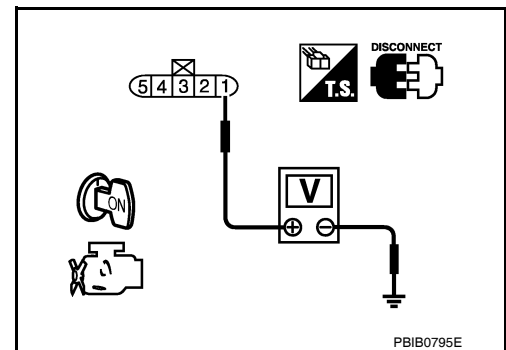
4.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

- Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- Disconnect "fuel level sensor unit and fuel pump" harness connector.
- Turn ignition switch ON.
- Check the voltage between "fuel level sensor unit and fuel pump" harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage
Connector	Terminal		
B100	1	Ground	Battery voltage should exist 1 second after ignition switch is turn ON.

Is the inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 5.



5.CHECK FUSE

- Turn ignition switch OFF.
- Disconnect 15 A fuse (No. 48) from IPDM E/R.
- Check 15 A fuse.

Is the inspection result normal?

- YES >> GO TO 6.

FUEL PUMP

[HR16DE]

< COMPONENT DIAGNOSIS >

NO >> Replace 15 A fuse.

6. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

1. Disconnect IPDM E/R harness connector E45.
2. Check the continuity between IPDM E/R harness connector and “fuel level sensor unit and fuel pump” harness connector.

IPDM E/R		Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E45	36	B100	1	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E7, M69
- Harness connectors M12, B101
- Harness for open or short between IPDM E/R and “fuel level sensor unit and fuel pump”

>> Repair open circuit or short to power in harness or connectors.

8. CHECK FUEL PUMP GROUND CIRCUIT

1. Check the continuity between “fuel level sensor unit and fuel pump” and ground.

Fuel level sensor unit and fuel pump		Ground	Continuity
Connector	Terminal		
B100	3	Ground	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit or short to power in harness or connectors.

9. CHECK FUEL PUMP

Refer to [EC-430, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace “fuel level sensor unit and fuel pump”.

10. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace harness or connectors.

Component Inspection

INFOID:000000005398613

1. CHECK FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.

FUEL PUMP

[HR16DE]

< COMPONENT DIAGNOSIS >

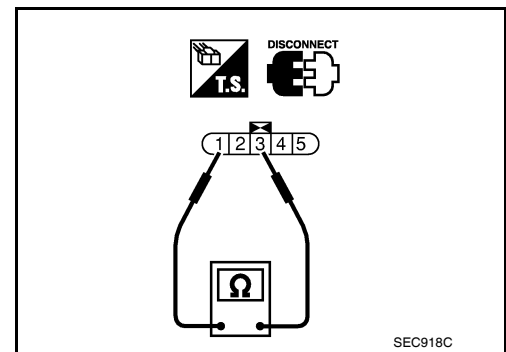
3. Check resistance between “fuel level sensor unit and fuel pump” terminals as per the following.

Terminals	Resistance
1 and 3	0.2 - 5.0 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace “fuel level sensor unit and fuel pump”.



A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

IGNITION SIGNAL

Description

INFOID:000000005398614

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.

Component Function Check

INFOID:000000005398615

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

- YES-1 >> With CONSULT-III: GO TO 2.
- YES-2 >> Without CONSULT-III: GO TO 3.
- NO >> Go to [EC-434, "Diagnosis Procedure"](#).

2.IGNITION SIGNAL FUNCTION

With CONSULT-III

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
2. Make sure that each circuit produces a momentary engine speed drop.

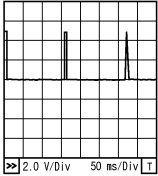
Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to [EC-434, "Diagnosis Procedure"](#).

3.IGNITION SIGNAL FUNCTION

Without CONSULT-III

1. Let engine idle.
2. Read the voltage signal between ECM harness connector and ground.

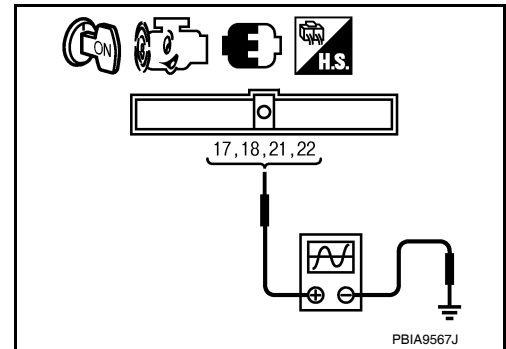
ECM		Ground	Voltage signal
Connector	Terminal		
F10	17	Ground	
	18		
	21		
	22		

NOTE:

The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to [EC-434, "Diagnosis Procedure"](#).



IGNITION SIGNAL

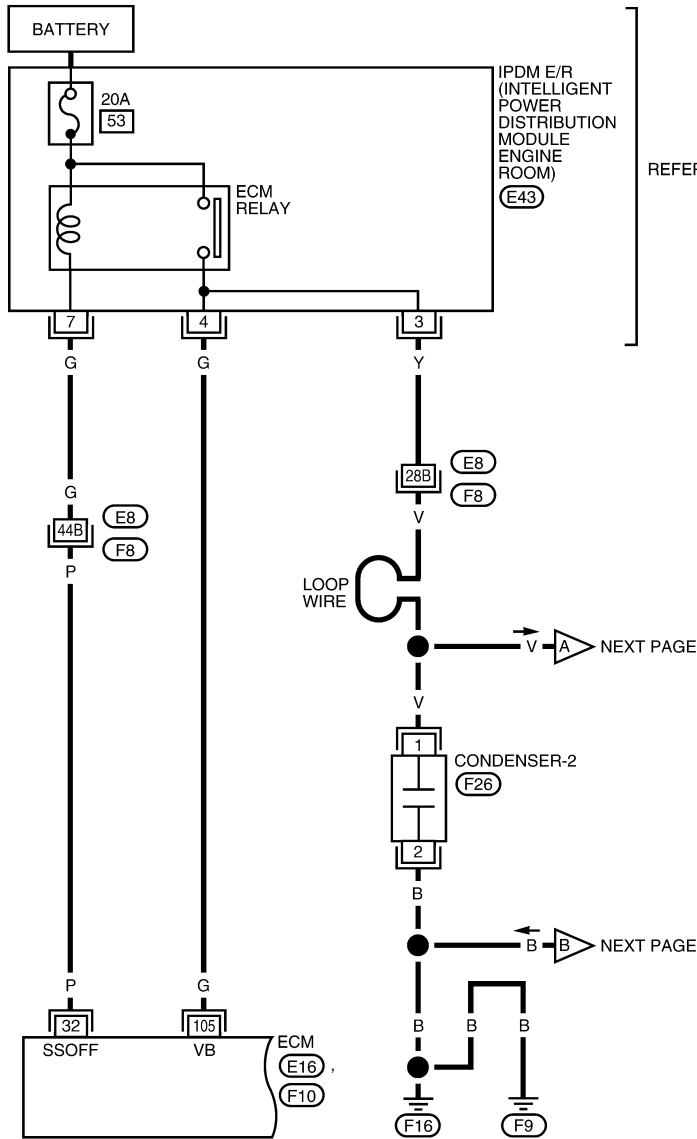
< COMPONENT DIAGNOSIS >

[HR16DE]

INFOID:000000005398616

Wiring Diagram

EC-IGNSYS-01

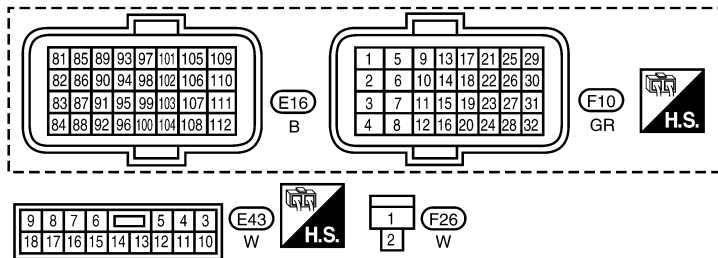


— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC

REFER TO "PG-POWER".

V → A NEXT PAGE

B → B NEXT PAGE



REFER TO THE FOLLOWING.
 (F8) - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2658E

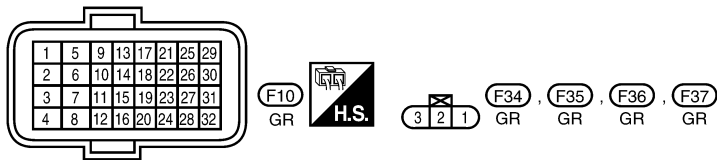
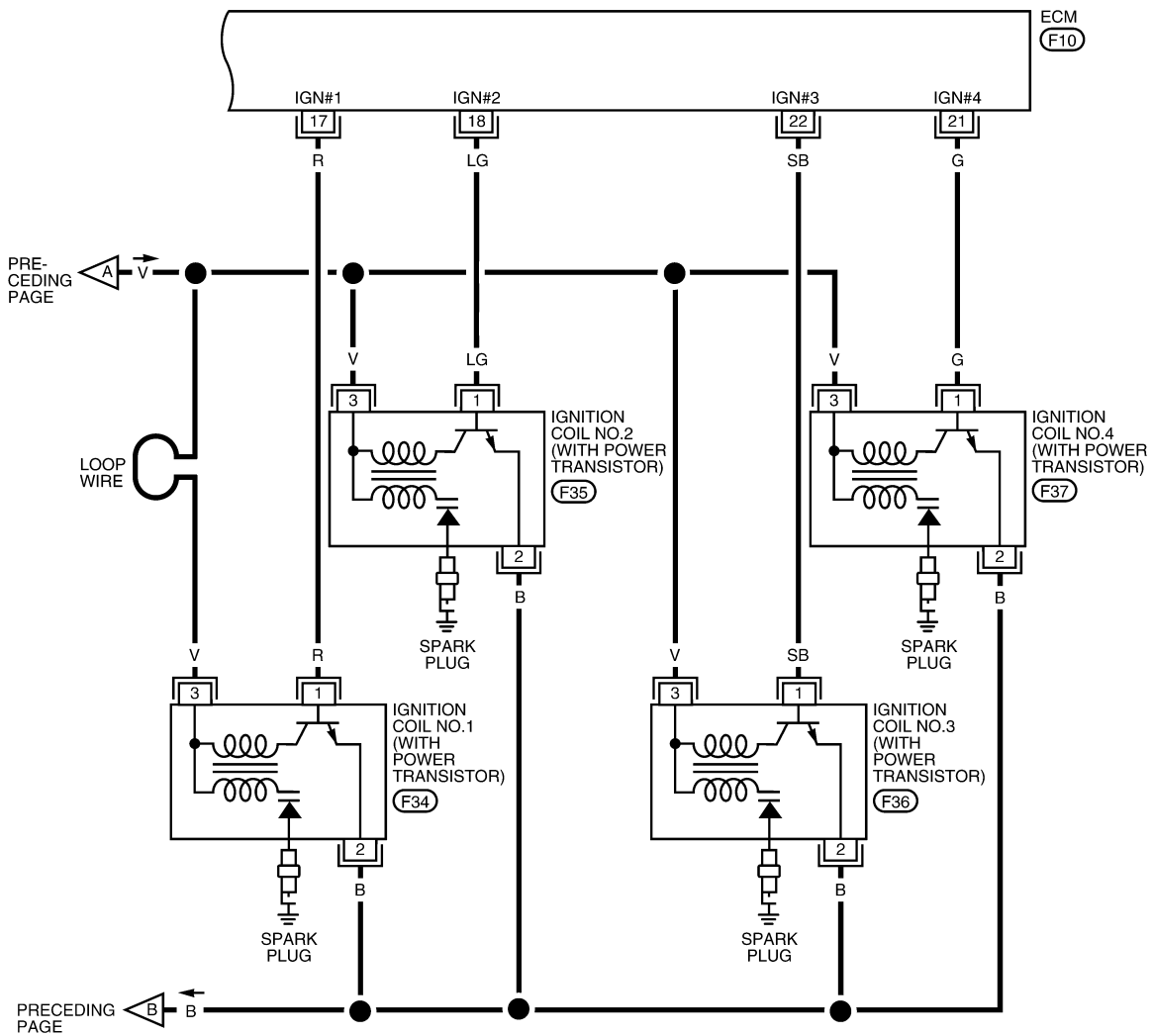
IGNITION SIGNAL

< COMPONENT DIAGNOSIS >

[HR16DE]

EC-IGNSYS-02

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA2659E

INFOID:000000005398617

Diagnosis Procedure

1. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.

IGNITION SIGNAL

[HR16DE]

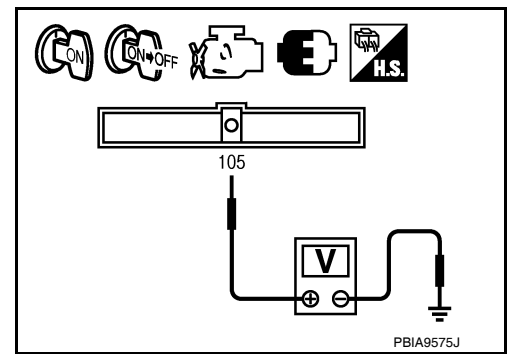
< COMPONENT DIAGNOSIS >

- Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E16	105	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Go to [EC-115. "Diagnosis Procedure"](#).



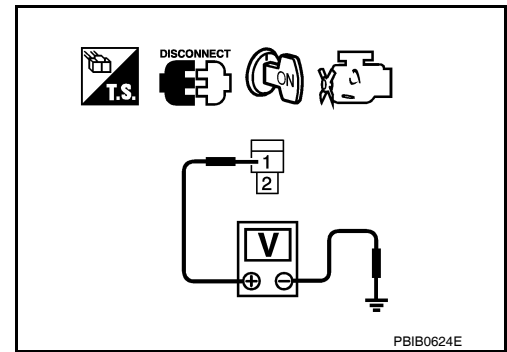
2.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

- Turn ignition switch OFF.
- Disconnect condenser-2 harness connector.
- Turn ignition switch ON.
- Check the voltage between condenser-2 harness connector and ground.

Condenser-2		Ground	Voltage
Connector	Terminal		
F26	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> GO TO 3.



3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

- Turn ignition switch OFF.
- Disconnect IPDM E/R harness connector E43.
- Check the continuity between IPDM E/R harness connector and condenser-2 harness connector.

IPDM E/R		Condenser-2		Continuity
Connector	Terminal	Connector	Terminal	
E43	3	F26	1	Existed

- Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Go to [EC-115. "Diagnosis Procedure"](#).
 NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- IPDM E/R harness connector E43
- Harness for open or short between IPDM E/R and condenser-2

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK CONDENSER-2 GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Check the continuity between condenser-2 harness connector and ground.

Condenser-2		Ground	Continuity
Connector	Terminal		
F26	2	Ground	Existed

IGNITION SIGNAL

[HR16DE]

< COMPONENT DIAGNOSIS >

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CONDENSER

Refer to [EC-438, "Component Inspection \(Condenser-2\)"](#).

Is the inspection result normal?

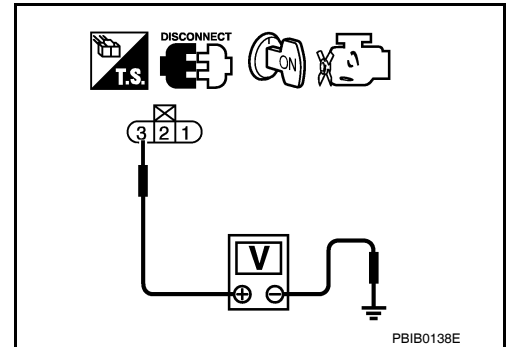
YES >> GO TO 7.

NO >> Replace condenser.

7. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Reconnect all harness connectors disconnected.
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ignition coil harness connector and ground.

Ignition coil			Ground	Voltage
Cylinder	Connector	Terminal		
1	F34	3	Ground	Battery voltage
2	F35	3		
3	F36	3		
4	F37	3		



Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity
Cylinder	Connector	Terminal		
1	F34	2	Ground	Existed
2	F35	2		
3	F36	2		
4	F37	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

IGNITION SIGNAL

< COMPONENT DIAGNOSIS >

[HR16DE]

Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F34	1	F14	17	Existed
2	F35	1		18	
3	F36	1		22	
4	F37	1		21	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to [EC-437. "Component Inspection \(Ignition Coil with Power Transistor\)".](#)

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace malfunctioning ignition coil with power transistor.

11. CHECK INTERMITTENT INCIDENT

Refer to [EC-114. "Diagnosis Procedure".](#)

>> INSPECTION END

Component Inspection (Ignition Coil with Power Transistor)

INFOID:000000005398618

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-I

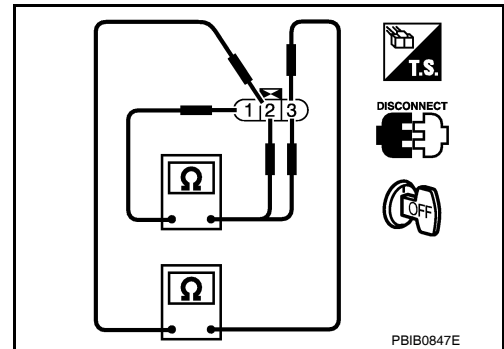
1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as per the following.

Terminals	Resistance [Ω at 25°C (77°F)]
1 and 2	Except 0 or ∞
1 and 3	Except 0
2 and 3	

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning ignition coil with power transistor.



2. CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

NOTE:

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

4. Start engine.
5. After engine stalls, crank it two or three times to release all fuel pressure.
6. Turn ignition switch OFF.
7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
8. Remove ignition coil and spark plug of the cylinder to be checked.
9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.

IGNITION SIGNAL

[HR16DE]

< COMPONENT DIAGNOSIS >

10. Connect spark plug and harness connector to ignition coil.
11. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

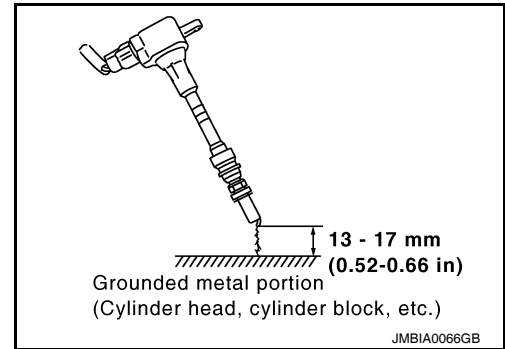
Spark should be generated.

CAUTION:

- During the operation, always stay 0.5 cm (19.7 in) away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.

NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning ignition coil with power transistor.

Component Inspection (Condenser-2)

INFOID:000000005398619

1. CHECK CONDENSER-2

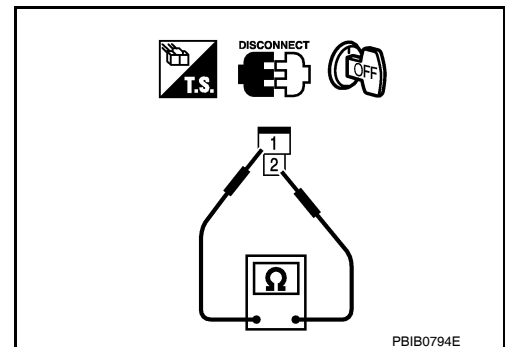
1. Turn ignition switch OFF.
2. Disconnect condenser-2 harness connector.
3. Check resistance between condenser-2 terminals as per the following.

Terminals	Resistance
1 and 2	Above 1 M Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace condenser-2.



MALFUNCTION INDICATOR LAMP

< COMPONENT DIAGNOSIS >

[HR16DE]

MALFUNCTION INDICATOR LAMP

Description

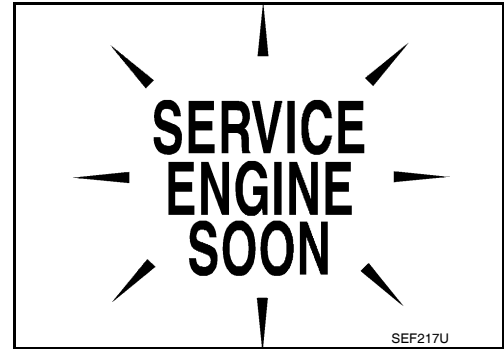
INFOID:000000005398620

The Malfunction Indicator Lamp (MIL) is located on the combination meter.

The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.

When the engine is started, the MIL should go off. If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.

For details, refer to [EC-84. "Diagnosis Description"](#).



Component Function Check

INFOID:000000005398621

1. CHECK MIL FUNCTION

1. Turn ignition switch ON.
2. Make sure that MIL lights up.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Go to [EC-441. "Diagnosis Procedure"](#).

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

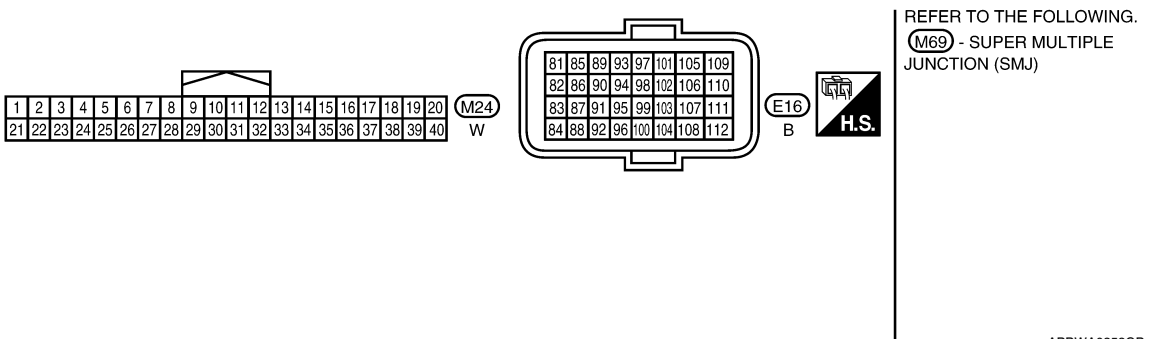
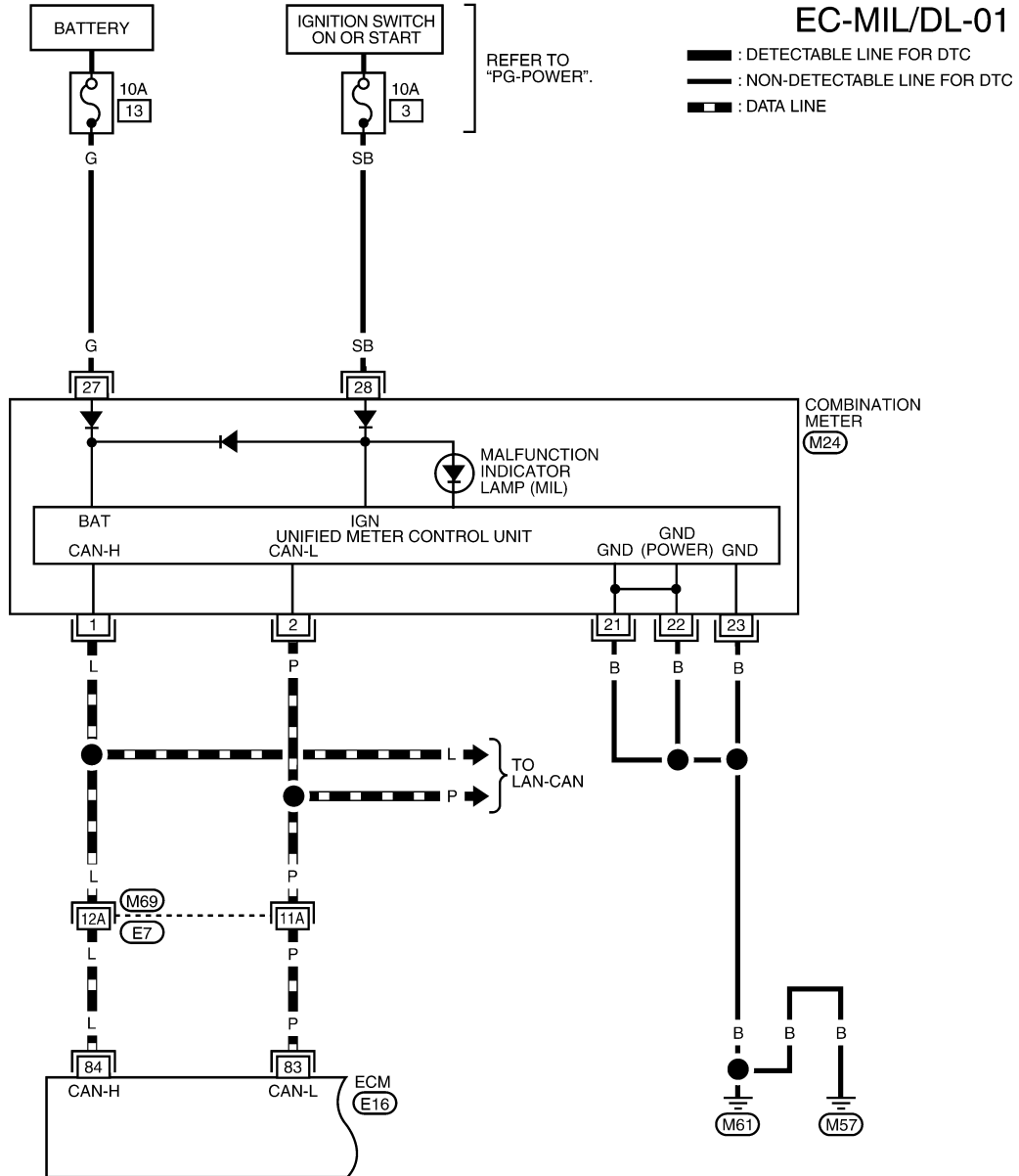
MALFUNCTION INDICATOR LAMP

< COMPONENT DIAGNOSIS >

[HR16DE]

Wiring Diagram

INFOID:000000005398622



MALFUNCTION INDICATOR LAMP

< COMPONENT DIAGNOSIS >

[HR16DE]

EC-MIL/DL-02

A

EC

C

D

E

F

G

H

I

J

K

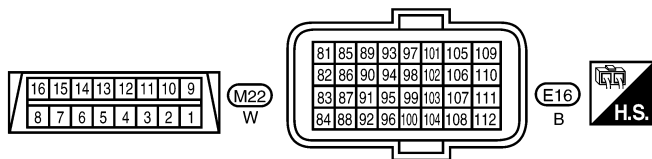
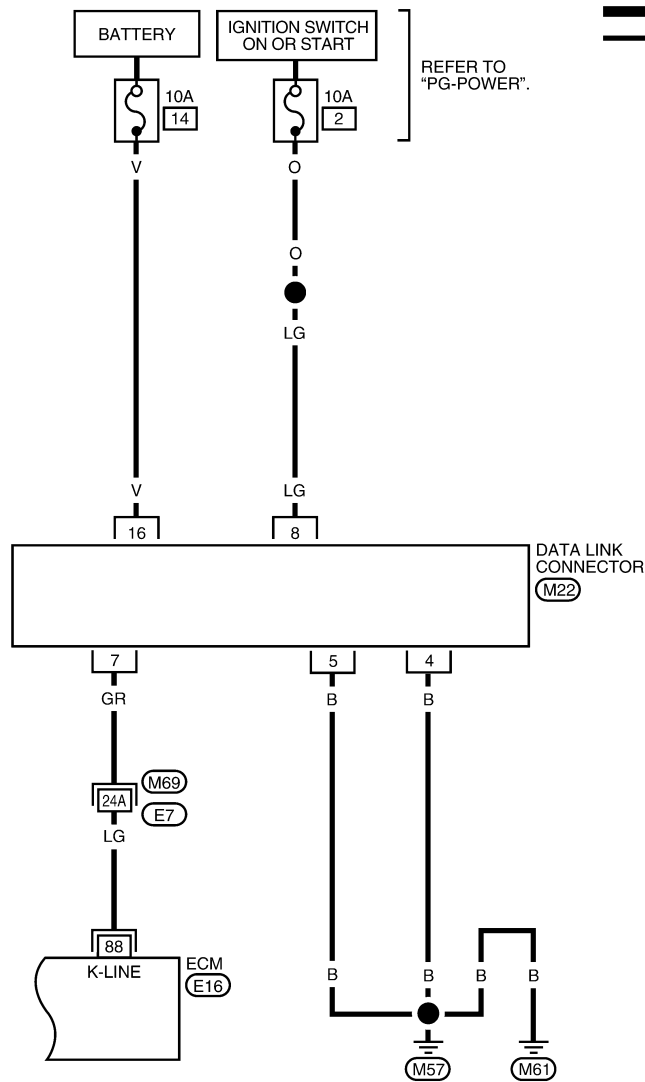
L

M

N

O

P



REFER TO THE FOLLOWING.
 (M69) - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2998E

INFOID:000000005398623

Diagnosis Procedure

1. CHECK DTC

Check that DTC UXXXX is not displayed.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble diagnosis for DTC UXXXX.

MALFUNCTION INDICATOR LAMP

< COMPONENT DIAGNOSIS >

[HR16DE]

2.CHECK DTC WITH METER

Refer to [DI-13, "CONSULT-III Function \(METER/M&A\)"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Replace combination meter.

NO >> Repair or replace.

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

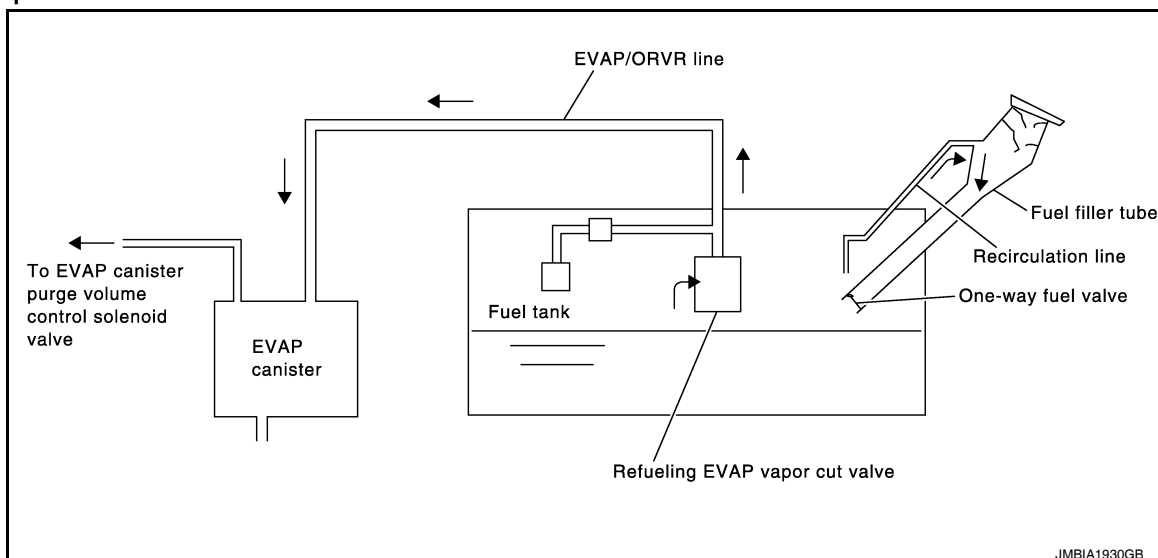
< COMPONENT DIAGNOSIS >

[HR16DE]

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

Description

INFOID:000000005398624



From the beginning of refueling, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve and EVAP/ORVR line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

WARNING:

When conducting inspections below, be sure to observe the following:

- Put a "CAUTION: FLAMMABLE" sign in workshop.
- Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Be sure to furnish the workshop with a CO₂ fire extinguisher.

CAUTION:

- Before removing fuel line parts, carry out the following procedures:
 - Put drained fuel in an explosion-proof container and put lid on securely.
 - Release fuel pressure from fuel line. Refer to [FL-5, "Checking Fuel Line"](#).
 - Disconnect battery ground cable.
- Always replace O-ring when the fuel gauge retainer is removed.
- Do not kink or twist hose and tube when they are installed.
- Do not tighten hose and clamps excessively to avoid damaging hoses.
- After installation, run engine and check for fuel leaks at connection.
- Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

Component Function Check

INFOID:000000005398625

1. CHECK ORVR FUNCTION

Check whether the following symptoms are present.

- Fuel odor from EVAP canister is strong.
- Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Is any symptom present?

- YES >> Go to [EC-443, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005398626

1. INSPECTION START

Check whether the following symptoms are present.

- A: Fuel odor from EVAP canister is strong.

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

[HR16DE]

< COMPONENT DIAGNOSIS >

B: Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Which symptom is present?

- A >> GO TO 2.
- B >> GO TO 8.

2.CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

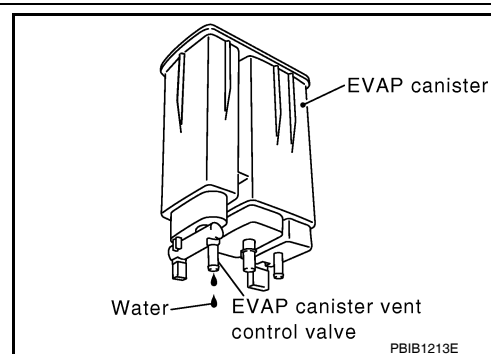
- YES >> GO TO 3.
- NO >> GO TO 4.

3.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

- YES >> GO TO 4.
- NO >> GO TO 7.



4.REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 5.

5.CHECK DRAIN FILTER

Refer to [EC-448. "Component Inspection \(Drain filter\)".](#)

Is the inspection result normal?

- OK >> GO TO 6.
- NO >> Replace drain filter.

6.DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

7.CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to [EC-446. "Component Inspection \(Refueling EVAP vapor cut valve\)".](#)

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace refueling EVAP vapor cut valve with fuel tank.

8.CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< COMPONENT DIAGNOSIS >

[HR16DE]

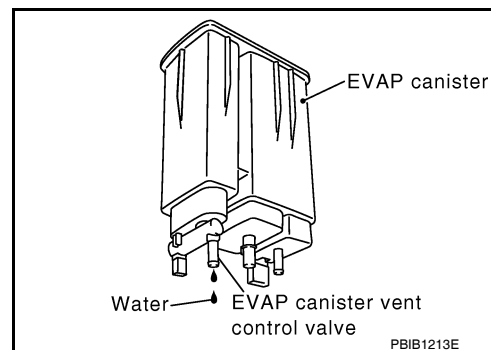
- YES >> GO TO 9.
- NO >> GO TO 10.

9. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

- YES >> GO TO 10.
- NO >> GO TO 13.



10. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 11.

11. CHECK DRAIN FILTER

Refer to [EC-448. "Component Inspection \(Drain filter\)".](#)

Is the inspection result normal?

- OK >> GO TO 12.
- NO >> Replace drain filter.

12. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

13. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.

Is the inspection result normal?

- YES >> GO TO 14.
- NO >> Repair or replace hoses and tubes.

14. CHECK RECIRCULATION LINE

Check recirculation line for clogging, dents and cracks.

Is the inspection result normal?

- YES >> GO TO 15.
- NO >> Replace fuel filler tube.

15. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to [EC-446. "Component Inspection \(Refueling EVAP vapor cut valve\)".](#)

Is the inspection result normal?

- YES >> GO TO 16.
- NO >> Replace refueling EVAP vapor cut valve with fuel tank.

16. CHECK FUEL FILLER TUBE

Check fuel filler tube and hose connected to the fuel tank for clogging, dents and cracks.

Is the inspection result normal?

- YES >> GO TO 17.
- NO >> Replace fuel filler tube.

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< COMPONENT DIAGNOSIS >

[HR16DE]

17. CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair or replace one-way fuel valve with fuel tank.

18. CHECK ONE-WAY FUEL VALVE-II

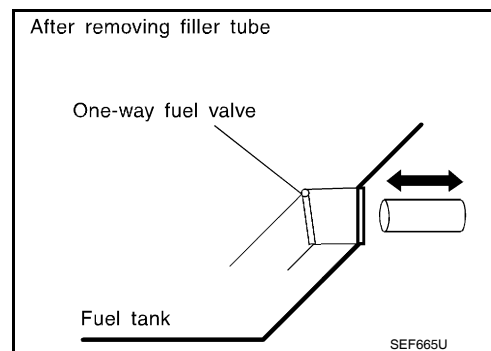
1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as per the following.
When a stick is inserted, the valve should open, when removing stick it should close.

Do not drop any material into the tank.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.



Component Inspection (Refueling EVAP vapor cut valve)

INFOID:000000005398627

1. INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK REFUELING EVAP VAPOR CUT VALVE

Ⓜ With CONSULT-III

1. Remove fuel tank. Refer to [FL-12, "Removal and Installation"](#).
2. Drain fuel from the tank as per the following:
 - Remove fuel feed hose located on the fuel gauge retainer.
 - Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
 - Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-III.
3. Check refueling EVAP vapor cut valve for being stuck to close as per the following.
Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as per the following.
 - Connect vacuum pump to hose end.
 - Remove fuel gauge retainer with fuel gauge unit.

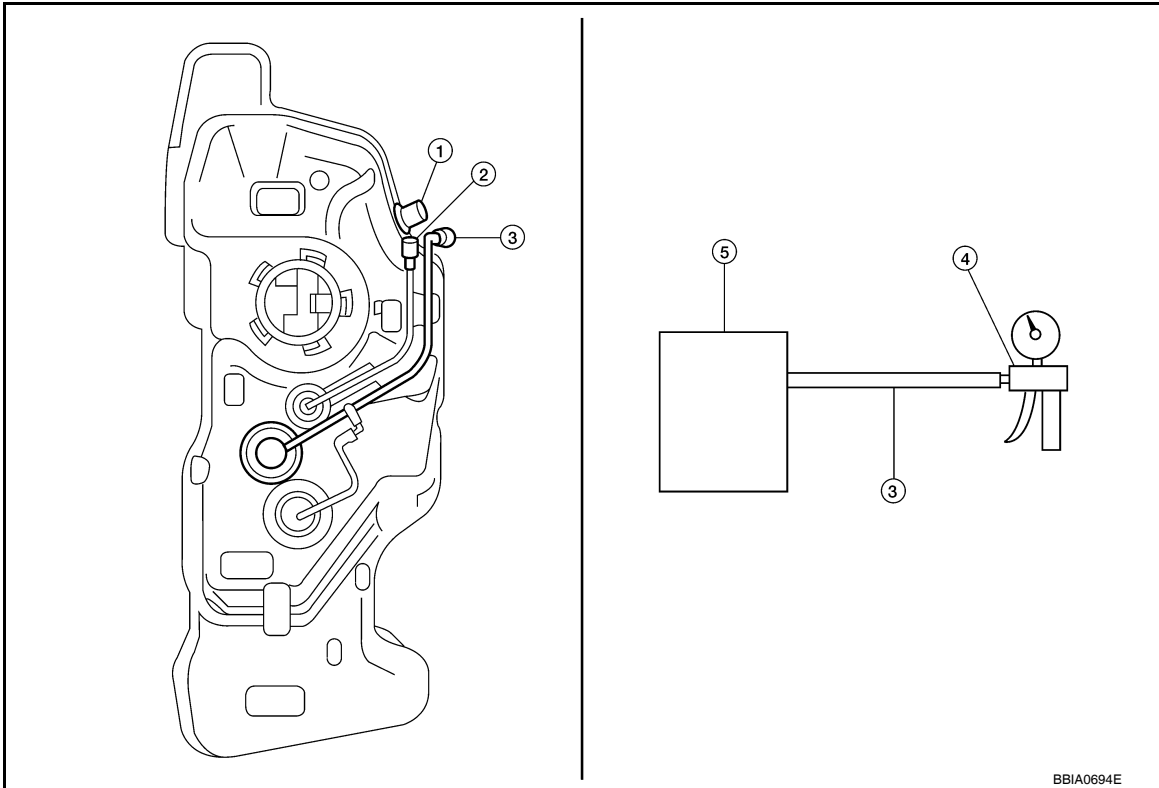
Always replace O-ring with new one.

 - Put fuel tank upside down.
 - Apply vacuum pressure to hose end [-13.3 kPa (-0.136 kg/cm³, -1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< COMPONENT DIAGNOSIS >

[HR16DE]



- 1. Filler tube
- 2. Recirculation line
- 3. EVAP/ORVR line
- 4. Vacuum/pressure handy pump
- 5. Fuel tank

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

3. CHECK REFUELING EVAP VAPOR CUT VALVE

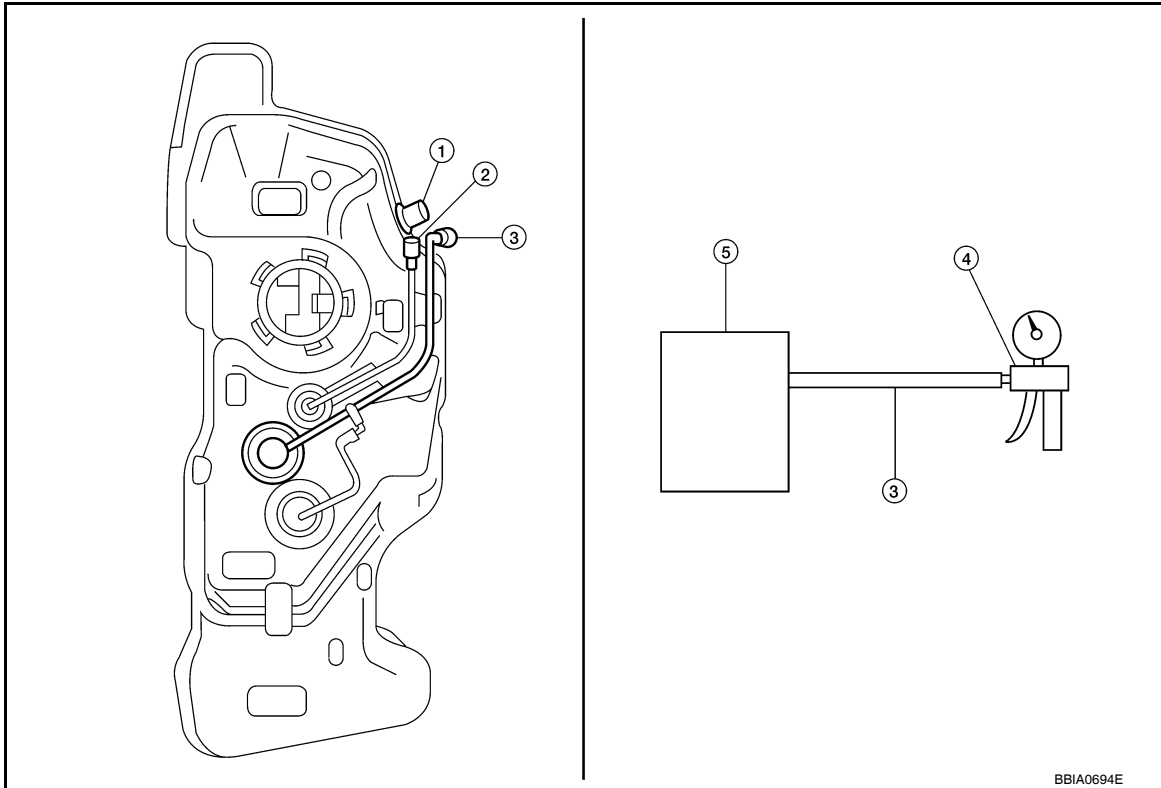
⊗ Without CONSULT-III

1. Remove fuel tank. Refer to [FL-12. "Removal and Installation"](#).
 2. Drain fuel from the tank as per the following:
 - Remove fuel gauge retainer.
 - Drain fuel from the tank using a handy pump into a fuel container.
 3. Check refueling EVAP vapor cut valve for being stuck to close as per the following. Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
 4. Check refueling EVAP vapor cut valve for being stuck to open as per the following.
 - Connect vacuum pump to hose end.
 - Remove fuel gauge retainer with fuel gauge unit.
- Always replace O-ring with new one.**
- Put fuel tank upside down.
 - Apply vacuum pressure to hose end [-13.3 kPa (-0.136 kg/cm³, -1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< COMPONENT DIAGNOSIS >

[HR16DE]



- 1. Filler tube
- 2. Recirculation line
- 3. EVAP/ORVR line
- 4. Vacuum/pressure handy pump
- 5. Fuel tank

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace refueling EVAP vapor cut valve with fuel tank.

Component Inspection (Drain filter)

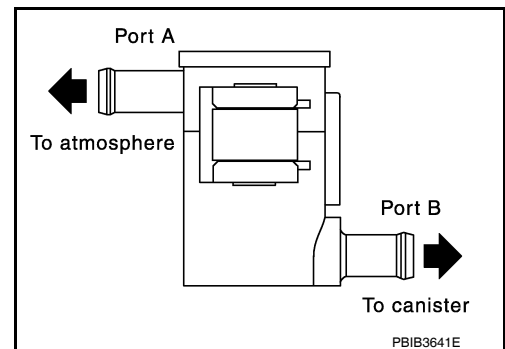
INFOID:000000005398628

1. CHECK DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace drain filter.



POSITIVE CRANKCASE VENTILATION

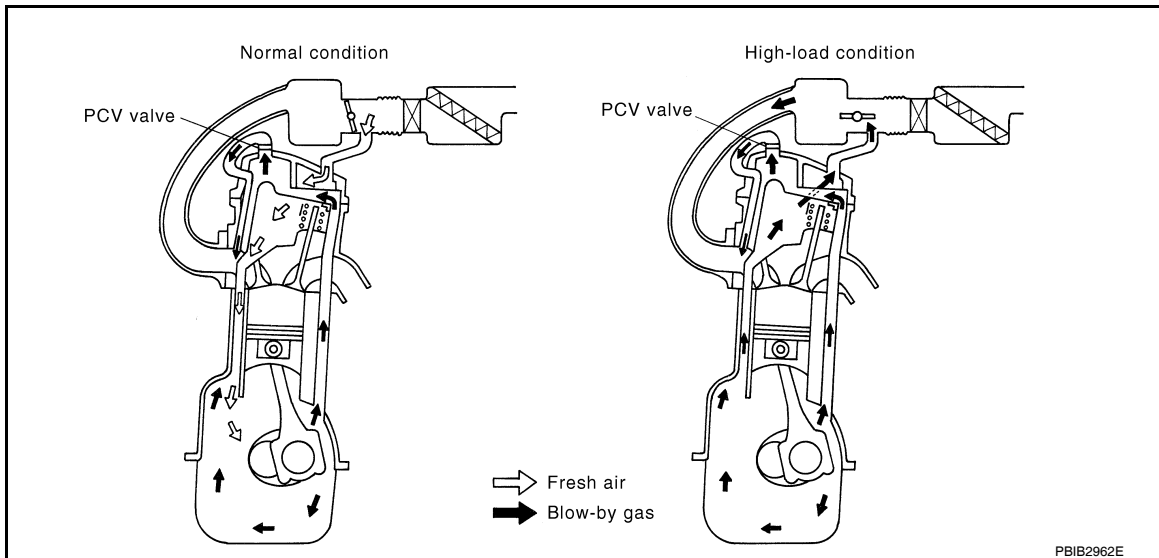
< COMPONENT DIAGNOSIS >

[HR16DE]

POSITIVE CRANKCASE VENTILATION

Description

INFOID:000000005398629



This system returns blow-by gas to the intake manifold.

The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

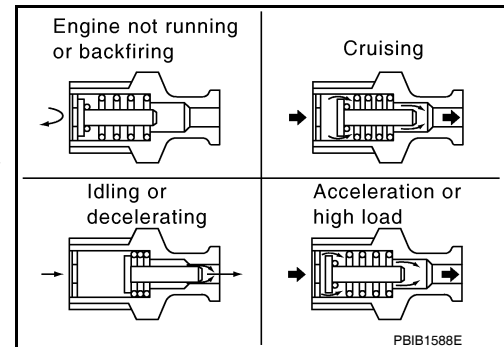
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

The ventilating air is drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



Component Inspection

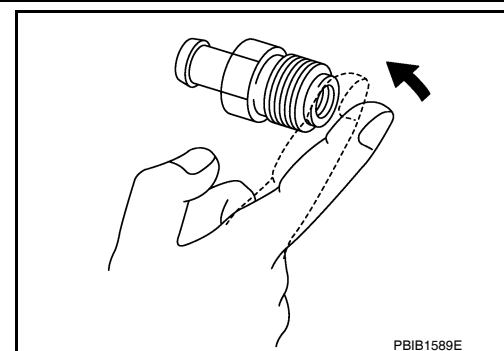
INFOID:000000005398630

1. CHECK PCV VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace PCV valve.



REFRIGERANT PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

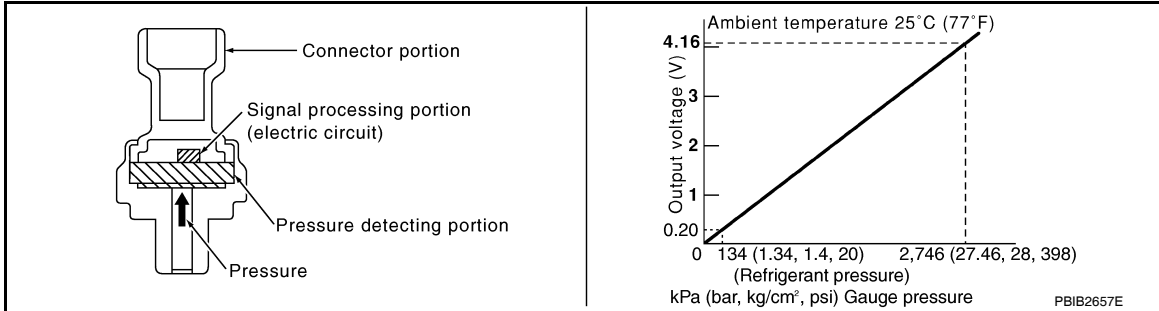
[HR16DE]

REFRIGERANT PRESSURE SENSOR

Description

INFOID:000000005398631

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



Component Function Check

INFOID:000000005398632

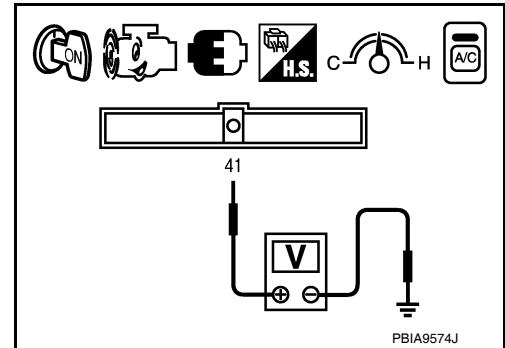
1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower fan switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F11	41 (Refrigerant pressure sensor signal)	Ground	1.0 - 4.0V

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Go to [EC-451, "Diagnosis Procedure"](#).



REFRIGERANT PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

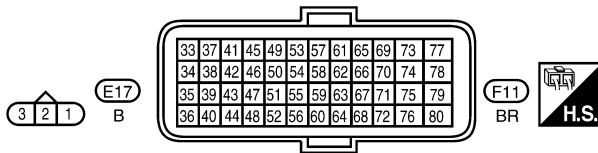
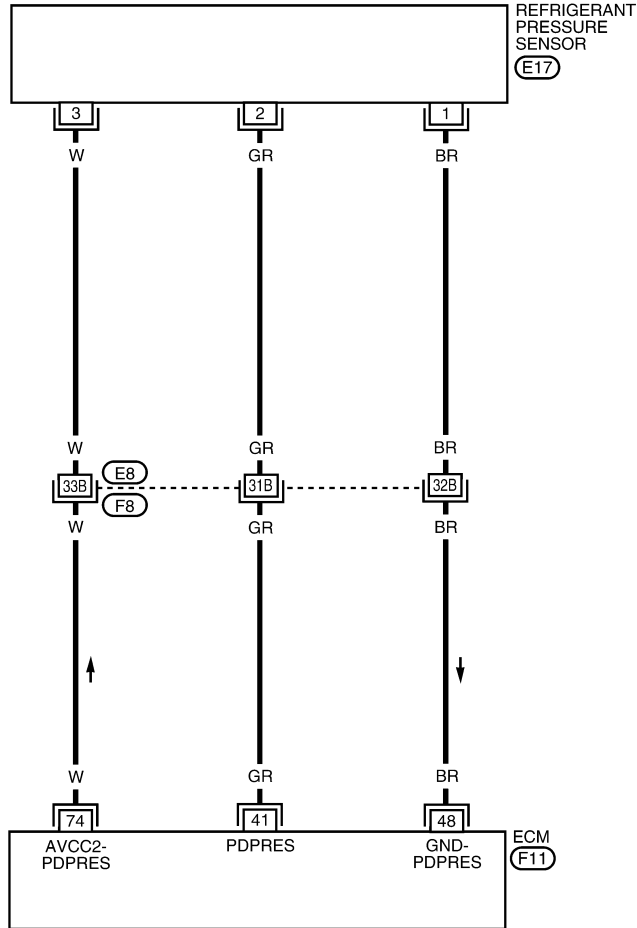
[HR16DE]

Wiring Diagram

INFOID:000000005398633

EC-RP/SEN-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

(F8) - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2662E

Diagnosis Procedure

INFOID:000000005398634

1. CHECK GROUND CONNECTION

1. Turn A/C switch and blower fan switch OFF.
2. Stop engine.
3. Turn ignition switch OFF.

REFRIGERANT PRESSURE SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

4. Check ground connections E15, E24. Refer to [EC-119, "Ground Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

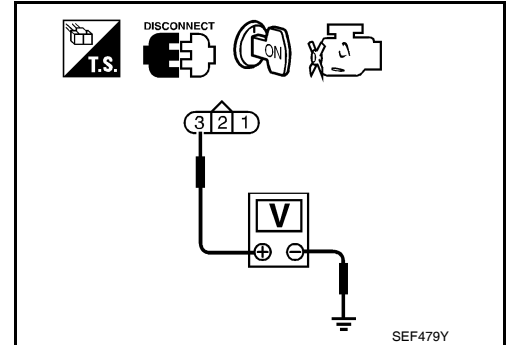
2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pressure sensor		Ground	Voltage
Connector	Terminal		
E17	3	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F8, E8
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E17	1	F11	48	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F8, E8
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and refrigerant pressure sensor harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E17	2	F11	41	Existed

2. Also check harness for short to ground and short to power.

REFRIGERANT PRESSURE SENSOR

[HR16DE]

< COMPONENT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F8, E8
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.

NO >> Repair or replace.

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

ECU DIAGNOSIS**ECM****Reference Value**

INFOID:000000005398635

VALUES ON THE DIAGNOSIS TOOL**Remarks:**

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.

*Specification data may not be directly related to their components signals/values/operations.

I.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. this IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

Monitor Item	Condition		Values/Status
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-107, "Diagnosis Procedure" .		
B/FUEL SCHDL	See EC-107, "Diagnosis Procedure" .		
A/F ALPHA-B1	See EC-107, "Diagnosis Procedure" .		
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158F)
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
HO2S2 (B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met.		0 - 0.3 V ←→ Approx. 0.6 - 1.0 V
HO2S2 MNTR (B1)	- Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		LEAN ←→ RICH
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14 V
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9 V
		Accelerator pedal: Fully depressed	4.0 - 4.8 V
ACCEL SEN 2	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9 V
		Accelerator pedal: Fully depressed	3.9 - 4.8 V
TP SEN 1-B1	• Ignition switch: ON (Engine stopped) • Selector lever position: D (A/T) or 1st (M/T)	Accelerator pedal: Fully released	More than 0.36 V
		Accelerator pedal: Fully depressed	Less than 4.75 V
TP SEN 2-B1	• Ignition switch: ON (Engine stopped) • Selector lever position: D (A/T) or 1st (M/T)	Accelerator pedal: Fully released	More than 0.36 V
		Accelerator pedal: Fully depressed	Less than 4.75 V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	• Ignition switch: ON	Selector lever position: P or N (A/T) or Neutral (M/T)	ON
		Selector lever position: Except above	OFF

ECM

< ECU DIAGNOSIS >

[HR16DE]

Monitor Item	Condition	Values/Status	
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON
		Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	• Ignition switch: ON → OFF → ON	ON → OFF → ON	
HEATER FAN SW	• Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1	• Engine: After warming up • Selector lever position: P or N (A/T) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	• Engine: After warming up • Selector lever position: P or N (A/T) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	10 - 20°BTDC
		2,000 rpm	25 - 45°BTDC
CAL/LD VALUE	• Engine: After warming up • Selector lever position: P or N (A/T) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	10 - 35%
		2,500 rpm	10 - 35%
MASS AIRFLOW	• Engine: After warming up • Selector lever position: P or N (A/T) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	2.0 - 10.0 g·m/s
PURG VOL C/V	• Engine: After warming up • Selector lever position: P or N (A/T) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0%
		2,000 rpm	0 - 50%
INT/V TIM (B1)	• Engine: After warming up • Selector lever position: P or N (A/T) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	-5 - 5°C
		2,000 rpm	Approx. 0 - 40°C
INT/V SOL (B1)	• Engine: After warming up • Selector lever position: P or N (A/T) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0 - 2%
		2,000 rpm	Approx. 0 - 90%
AIR COND RLY	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	• For 1 second after turning ignition switch: ON • Engine running or cranking	ON	
	• Except above	OFF	
THRTL RELAY	• Ignition switch: ON	ON	

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

ECM

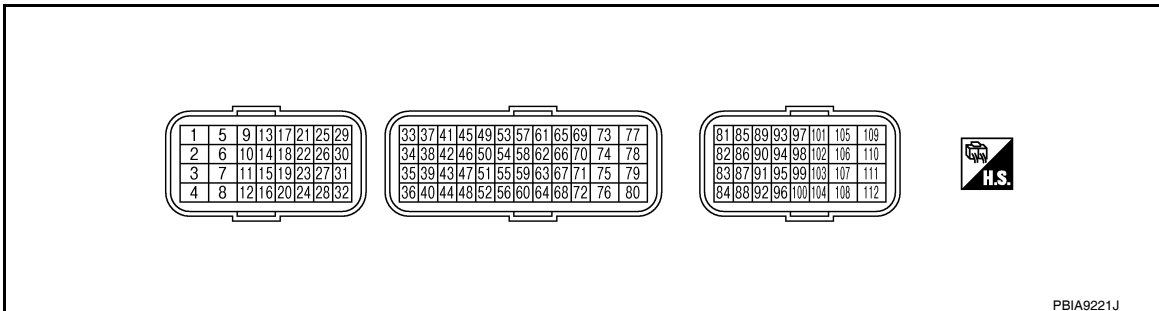
< ECU DIAGNOSIS >

[HR16DE]

Monitor Item	Condition	Values/Status	
COOLING FAN	Engine coolant temperature is 98°C (208°F) or less	OFF	
	• Engine: After warming up, idle the engine • Air conditioner switch: OFF	Engine coolant temperature is between 98°C (208°F) and 99°C (210°F)	LOW
	Engine coolant temperature is 100°C (212°F) or more	HIGH	
HO2S2 HTR (B1)	• Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON	
VEHICLE SPEED	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.	Almost the same speed as the speedometer indication	
IDL A/V LEARN	• Engine: running	Idle air volume learning has not been performed yet.	YET
		Idle air volume learning has already been performed successfully.	CMPLT
TRVL AFTER MIL	• Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	0 - 65,535 km (0 - 40,723 miles)
A/F S1 HTR (B1)	• Engine: After warming up, idle the engine		40 - 100%
AC PRESS SEN	• Engine: Idle • Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0 V
HO2 S2 DIAG2 (B1)	NOTE: The item is indicated, but not used.		—

*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

- ECM is located in the engine room left side near battery.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

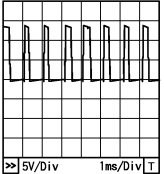
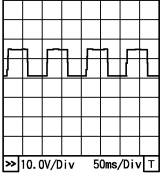
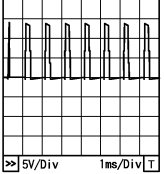
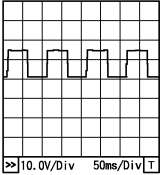
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

ECM

< ECU DIAGNOSIS >

[HR16DE]

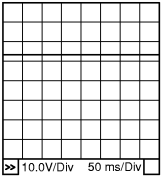
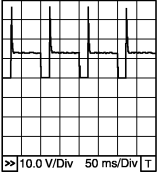
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L	Throttle control motor (Open)	[Ignition switch: ON] <ul style="list-style-type: none"> • Engine stopped • Selector lever position: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed 	Approximately 3.2 V★  <small>PBIA8150J</small>
2	SB	Throttle control motor power supply	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
3	G	A/F sensor 1 heater	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed (More than 140 seconds after starting engine) 	Approximately 2.9 - 8.8 V★  <small>PBIA8148J</small>
4	P	Throttle control motor (Close)	[Ignition switch: ON] <ul style="list-style-type: none"> • Engine stopped • Selector lever position: D (A/T), 1st (M/T) • Accelerator pedal: Fully released 	0 - 14 V★  <small>PBIA8149J</small>
5	G	Heated oxygen sensor 2 heater	[Engine is running] <ul style="list-style-type: none"> • Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. 	Approximately 10 V★  <small>PBIA8148J</small>
			[Ignition switch: ON] <ul style="list-style-type: none"> • Engine stopped [Engine is running] <ul style="list-style-type: none"> • Engine speed: Above 3,600 rpm. 	BATTERY VOLTAGE (11 - 14 V)

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

ECM

< ECU DIAGNOSIS >

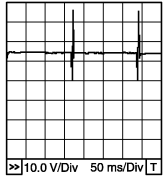
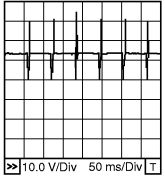
[HR16DE]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	P	EVAP canister purge volume control solenoid valve	<p>[Engine is running]</p> <ul style="list-style-type: none"> • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting. 	<p>BATTERY VOLTAGE (11 - 14 V)★</p>  <p style="text-align: right; font-size: small;">PBIB0050E</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine) 	<p>BATTERY VOLTAGE (11 - 14 V)★</p>  <p style="text-align: right; font-size: small;">PBIB0520E</p>
10 11	B B	ECM ground	<p>[Engine is running]</p> <ul style="list-style-type: none"> • Idle speed 	Body ground
15	Y	Throttle control motor relay	<p>[Ignition switch: OFF]</p>	BATTERY VOLTAGE (11 - 14 V)
			<p>[Ignition switch: ON]</p>	0 - 1.0 V
17 18 21 22	R LG G SB	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 4 Ignition signal No. 3	<p>[Engine is running]</p> <ul style="list-style-type: none"> • Warm-up condition • Idle speed <p>NOTE: The pulse cycle changes depending on rpm at idle.</p>	0 - 0.3 V★
			<p>[Engine is running]</p> <ul style="list-style-type: none"> • Warm-up condition • Engine speed: 2,500 rpm. 	0.2 - 0.5 V★
23	GR	Fuel pump relay	<p>[Ignition switch: ON]</p> <ul style="list-style-type: none"> • For 1 second after turning ignition switch ON 	0 - 1.0 V
			<p>[Engine is running]</p> <p>[Ignition switch: ON]</p> <ul style="list-style-type: none"> • More than 1 second after turning ignition switch ON 	BATTERY VOLTAGE (11 - 14 V)

ECM

< ECU DIAGNOSIS >

[HR16DE]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25 29 30 31	V Y O L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14 V)★  <p style="text-align: right; font-size: small;">PBIB0529E</p>
			[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Engine speed: 2,000 rpm 	BATTERY VOLTAGE (11 - 14 V)★  <p style="text-align: right; font-size: small;">PBIA4943J</p>
28	W	EVAP canister vent control valve	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
32	P	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] <ul style="list-style-type: none"> • For a few seconds after turning ignition switch OFF 	0 - 1.0 V
			[Ignition switch: OFF] <ul style="list-style-type: none"> • More than a few seconds after turning ignition switch OFF 	BATTERY VOLTAGE (11 - 14 V)
33	LG	Throttle position sensor 1	[Ignition switch: ON] <ul style="list-style-type: none"> • Engine stopped • Selector lever position: D (A/T), 1st (M/T) • Accelerator pedal: Fully released 	More than 0.36 V
			[Ignition switch: ON] <ul style="list-style-type: none"> • Engine stopped • Selector lever position: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed 	Less than 4.75 V
34	O	Throttle position sensor 2	[Ignition switch: ON] <ul style="list-style-type: none"> • Engine stopped • Selector lever position: D (A/T), 1st (M/T) • Accelerator pedal: Fully released 	Less than 4.75 V
			[Ignition switch: ON] <ul style="list-style-type: none"> • Engine stopped • Selector lever position: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed 	More than 0.36 V
36	Y	Sensor ground (Throttle position sensor)	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	Approximately 0 V
37	W	Knock sensor	[Engine is running] <ul style="list-style-type: none"> • Idle speed 	Approximately 2.5 V
38	P	Engine coolant temperature sensor	[Engine is running]	Approximately 0 - 4.8 V Output voltage varies with engine coolant temperature.
40	—	Sensor ground (Knock sensor)	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	Approximately 0 V

ECM

< ECU DIAGNOSIS >

[HR16DE]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
41	GR	Refrigerant pressure sensor	[Engine is running] • Warm-up condition • Both A/C switch and blower fan switch: ON (Compressor operates.)	1.0 - 4.0 V
42	V	EVAP control system pressure sensor	[Ignition switch: ON]	Approximately 1.8 - 4.8 V
43	P	Fuel tank temperature sensor	[Engine is running]	Approximately 0 - 4.8 V Output voltage varies with fuel tank temperature
44	B	Sensor ground (Engine coolant temperature sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
45	G	Mass air flow sensor	[Engine is running] • Warm-up condition • Idle speed	0.9 - 1.3 V
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	1.4 - 1.9 V
46	V	Intake air temperature sensor	[Engine is running]	Approximately 0 - 4.8 V Output voltage varies with intake air temperature.
48	BR	Sensor ground (Refrigerant pressure sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
49	W	A/F sensor 1	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 1.8 V Output voltage varies with air fuel ratio.
50	W	Heated oxygen sensor 2	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 1.0 V
51	O	Sensor ground (EVAP control system pressure sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
52	LG	Sensor ground (Mass air flow sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
53	B	A/F sensor 1	[Ignition switch: ON]	Approximately 2.2 V
55	O	Sensor ground (Intake air temperature sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
59	O	Sensor ground (Heated oxygen sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V

ECM

< ECU DIAGNOSIS >

[HR16DE]

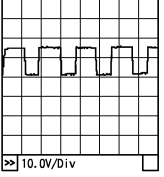
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
61	W	Crankshaft position sensor (POS)	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	Approximately 4.0 V★
			[Engine is running] <ul style="list-style-type: none"> • Engine speed: 2,000 rpm 	Approximately 4.0 V★
62	R	Sensor ground [Crankshaft position sensor (POS)]	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	Approximately 0 V
63	BR	Sensor ground [Camshaft position sensor (PHASE)]	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	Approximately 0 V
65	G	Camshaft position sensor (PHASE)	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	Approximately 3.6★
			[Engine is running] <ul style="list-style-type: none"> • Engine speed: 2,000 rpm. 	Approximately 3.6 V★
69	L	PNP signal	[Ignition switch: ON] <ul style="list-style-type: none"> • Selector lever position: P or N (A/T), Neutral (M/T) 	BATTERY VOLTAGE (11 - 14 V)
			[Ignition switch: ON] <ul style="list-style-type: none"> • Except above 	Approximately 0 V
72	V	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5 V

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

ECM

< ECU DIAGNOSIS >

[HR16DE]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
73	P	Intake valve timing control solenoid valve	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
			[Engine is running] • Warm-up condition • When revving engine up to 2,000 rpm quickly	7 - 10 V★ 
74	W	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	Approximately 5 V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	[Ignition switch: ON]	Approximately 5 V
76	W	EVAP control system pressure sensor power supply	[Ignition switch: ON]	Approximately 5 V
78	O	Sensor power supply [Camshaft position sensor (PHASE)]	[Ignition switch: ON]	Approximately 5 V
83	P	CAN communication line	—	—
84	L	CAN communication line	—	—
88	LG	DATA link connector	—	—
93	O	Ignition switch	[Ignition switch: OFF]	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
99	R	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0 V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)
102	SB	Sensor power supply (Accelerator pedal position sensor 2)	[Ignition switch: ON]	Approximately 5 V
103	GR	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6 V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4 V
104	Y	Sensor ground (Accelerator pedal position sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
105	G	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
106	P	Sensor power supply (Accelerator pedal position sensor 1)	[Ignition switch: ON]	Approximately 5 V
108	B	ECM ground	[Engine is running] • Idle speed	Body ground

ECM

< ECU DIAGNOSIS >

[HR16DE]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	
110	G	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9 V	A
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7 V	C
111	R	Sensor ground (Accelerator pedal position sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V	D

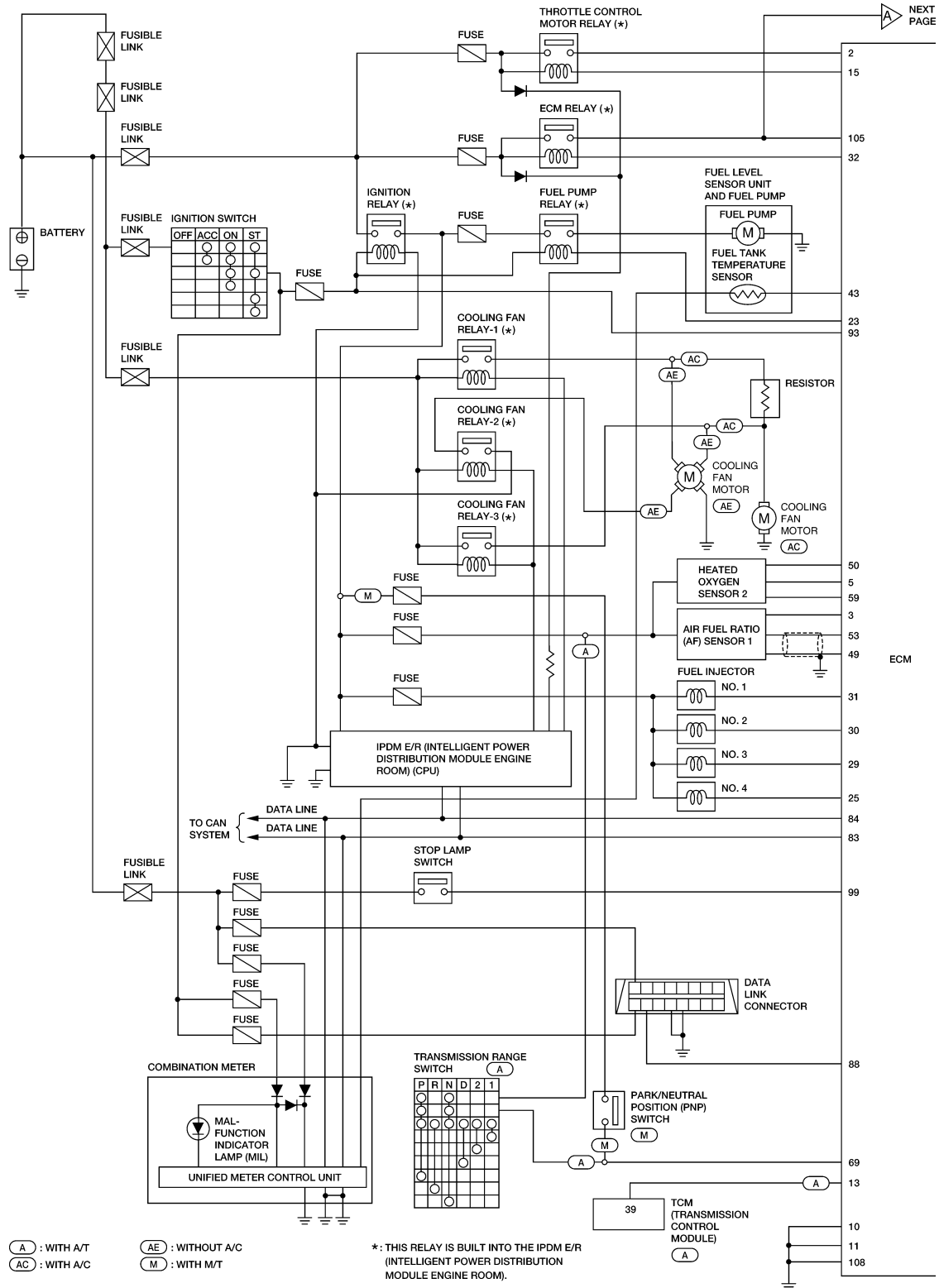
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

EC

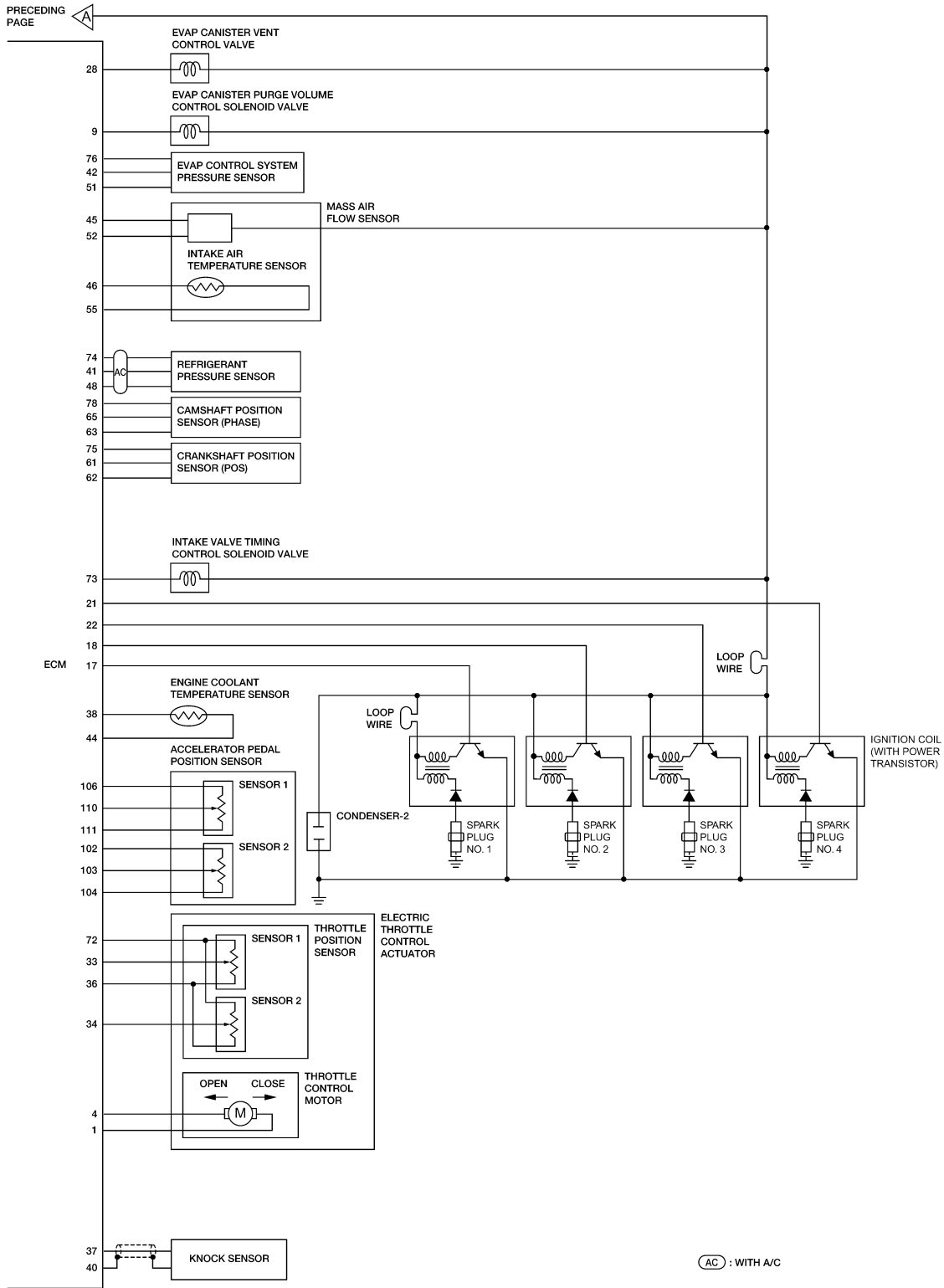
E
F
G
H
I
J
K
L
M
N
O
P

Wiring Diagram — ENGINE CONTROL SYSTEM —

INFOID:000000005398636



ABBWA0349GB



A
EC
 C
 D
 E
 F
 G
 H
 I
 J
 K
 L
 M
 N
 O
 P

Fail Safe

NON DTC RELATED ITEM

AABWA0306GB

INFOID:000000005398637

ECM

< ECU DIAGNOSIS >

[HR16DE]

Detected items	Engine operating condition in fail-safe mode	Remarks
Malfunction indicator lamp circuit	Engine speed will not rise more than 2,500 rpm due to the fuel cut	When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function. The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail-safe mode								
P0011	Intake valve timing control	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function.								
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.								
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the following condition. CONSULT-III displays the engine coolant temperature decided by ECM. <table border="1" style="width: 100%; margin-top: 5px;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Engine coolant temperature decided (CONSULT-III display)</th> </tr> </thead> <tbody> <tr> <td>Just as ignition switch is turned ON or START</td> <td style="text-align: center;">40°C (104°F)</td> </tr> <tr> <td>More than approx. 4 minutes after engine starting</td> <td style="text-align: center;">80°C (176°F)</td> </tr> <tr> <td>Except as shown above</td> <td style="text-align: center;">40 - 80°C (104 - 176°F) (Depends on the time)</td> </tr> </tbody> </table> <p>When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.</p>	Condition	Engine coolant temperature decided (CONSULT-III display)	Just as ignition switch is turned ON or START	40°C (104°F)	More than approx. 4 minutes after engine starting	80°C (176°F)	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
Condition	Engine coolant temperature decided (CONSULT-III display)									
Just as ignition switch is turned ON or START	40°C (104°F)									
More than approx. 4 minutes after engine starting	80°C (176°F)									
Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)									
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.								
P0643	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.								
P0605	ECM	(When ECM calculation function is malfunctioning:) ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.								
P1805	Brake switch	ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor. <table border="1" style="width: 100%; margin-top: 5px;"> <thead> <tr> <th style="text-align: center;">Vehicle condition</th> <th style="text-align: center;">Driving condition</th> </tr> </thead> <tbody> <tr> <td>When engine is idling</td> <td style="text-align: center;">Normal</td> </tr> <tr> <td>When accelerating</td> <td style="text-align: center;">Poor acceleration</td> </tr> </tbody> </table>	Vehicle condition	Driving condition	When engine is idling	Normal	When accelerating	Poor acceleration		
Vehicle condition	Driving condition									
When engine is idling	Normal									
When accelerating	Poor acceleration									
P2100 P2103	Throttle control motor relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.								
P2101	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.								
P2118	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.								

ECM

< ECU DIAGNOSIS >

[HR16DE]

DTC No.	Detected items	Engine operating condition in fail-safe mode
P2119	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P (A/T), Neutral (M/T) position, and engine speed will not exceed 1,000 rpm or more.
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Inspection Priority Chart

INFOID:000000005398638

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	<ul style="list-style-type: none"> • U0101 U0140 U1001 CAN communication line • P0101 P0102 P0103 Mass air flow sensor • P0112 P0113 P0127 Intake air temperature sensor • P0116 P0117 P0118 P0125 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0128 Thermostat function • P0181 P0182 P0183 Fuel tank temperature sensor • P0327 P0328 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0460 P0461 P0462 P0463 Fuel level sensor • P0500 Vehicle speed sensor • P0605 P0607 ECM • P0643 Sensor power supply • P0705 Transmission range switch • P0850 Park/neutral position (PNP) switch • P1610 - P1615 NATS • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor

Priority	Detected items (DTC)
2	<ul style="list-style-type: none"> • P0031 P0032 Air fuel ratio (A/F) sensor 1 heater • P0037 P0038 Heated oxygen sensor 2 heater • P0075 Intake valve timing control solenoid valve • P0130 P0131 P0132 P0133 P2A00 Air fuel ratio (A/F) sensor 1 • P0137 P0138 P0139 Heated oxygen sensor 2 • P0441 EVAP control system purge flow monitoring • P0443 P0444 P0445 EVAP canister purge volume control solenoid valve • P0447 P0448 EVAP canister vent control valve • P0451 P0452 P0453 EVAP control system pressure sensor • P0603 ECM power supply • P0710 P0720 P0725 P0731 P0732 P0733 P0734 P0740 P0744 P0745 P0750 P0755 P1705 P1760 A/T related sensors, solenoid valves and switches • P1217 Engine over temperature (OVERHEAT) • P1805 Brake switch • P2100 P2103 Throttle control motor relay • P2101 Electric throttle control function • P2118 Throttle control motor
3	<ul style="list-style-type: none"> • P0011 Intake valve timing control • P0171 P0172 Fuel injection system function • P0300 - P0304 Misfire • P0420 Three way catalyst function • P0442 P0456 EVAP control system (SMALL LEAK, VERY SMALL LEAK) • P0455 EVAP control system (GROSS LEAK) • P0506 P0507 Idle speed control system • P1148 Closed loop control • P1421 Cold start control • P1715 Input speed sensor • P2119 Electric throttle control actuator

DTC Index

INFOID:000000005398639

x:Applicable —: Not applicable

DTC*1		Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Permanent DTC group*4	Reference page
CONSULT-III GST*2	ECM*3						
U0101	0101*5	LOST COMM (TCM)	—	1	×	B	EC-120
U0140	0140*5	LOST COMM (BCM)	—	1	×	B	EC-122
U1001	1001*5	CAN COMM CIRCUIT	—	2	—	—	EC-120
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	—	Flashing*8	—	—
P0011	0011	INT/V TIM CONT-B1	×	2	×	B	EC-126
P0031	0031	A/F SEN1 HTR (B1)	—	2	×	B	EC-130
P0032	0032	A/F SEN1 HTR (B1)	—	2	×	B	EC-130
P0037	0037	HO2S2 HTR (B1)	—	2	×	B	EC-134
P0038	0038	HO2S2 HTR (B1)	—	2	×	B	EC-134
P0075	0075	INT/V TIM V/CIR-B1	—	2	×	B	EC-138
P0101	0101	MAF SEN/CIRCUIT-B1	—	2	×	B	EC-142
P0102	0102	MAF SEN/CIRCUIT-B1	—	1	×	B	EC-150
P0103	0103	MAF SEN/CIRCUIT-B1	—	1	×	B	EC-150
P0112	0112	IAT SEN/CIRCUIT-B1	—	2	×	B	EC-156
P0113	0113	IAT SEN/CIRCUIT-B1	—	2	×	B	EC-156
P0116	0116	ECT SEN/CIRC	—	2	×	B	EC-159
P0117	0117	ECT SEN/CIRC	—	1	×	B	EC-161

ECM

< ECU DIAGNOSIS >

[HR16DE]

DTC*1		Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Permanent DTC group*4	Reference page	
CONSULT-III GST*2	ECM*3							
P0118	0118	ECT SEN/CIRC	—	1	×	B	EC-161	A
P0122	0122	TP SEN 2/CIRC-B1	—	1	×	B	EC-165	EC
P0123	0123	TP SEN 2/CIRC-B1	—	1	×	B	EC-165	
P0125	0125	ECT SENSOR	—	2	×	B	EC-169	C
P0127	0127	IAT SENSOR-B1	—	2	×	B	EC-172	
P0128	0128	THERMSTAT FNCTN	—	2	×	B	EC-174	D
P0130	0130	A/F SENSOR1 (B1)	—	2	×	A	EC-176	
P0131	0131	A/F SENSOR1 (B1)	—	2	×	B	EC-182	
P0132	0132	A/F SENSOR1 (B1)	—	2	×	B	EC-187	E
P0133	0133	A/F SENSOR1 (B1)	×	2	×	A	EC-192	
P0137	0137	HO2S2 (B1)	×	2	×	A	EC-198	F
P0138	0138	HO2S2 (B1)	×	2	×	A	EC-206	
P0139	0139	HO2S2 (B1)	×	2	×	A	EC-215	G
P0171	0171	FUEL SYS-LEAN-B1	—	2	×	B	EC-223	
P0172	0172	FUEL SYS-RICH-B1	—	2	×	B	EC-229	H
P0181	0181	FTT SENSOR	—	2	×	B	EC-234	
P0182	0182	FTT SEN/CIRCUIT	—	2	×	B	EC-239	I
P0183	0183	FTT SEN/CIRCUIT	—	2	×	B	EC-239	
P0222	0222	TP SEN 1/CIRC-B1	—	1	×	B	EC-243	J
P0223	0223	TP SEN 1/CIRC-B1	—	1	×	B	EC-243	
P0300	0300	MULTI CYL MISFIRE	—	1 or 2	×	B	EC-247	K
P0301	0301	CYL 1 MISFIRE	—	1 or 2	×	B	EC-247	
P0302	0302	CYL 2 MISFIRE	—	1 or 2	×	B	EC-247	L
P0303	0303	CYL 3 MISFIRE	—	1 or 2	×	B	EC-247	
P0304	0304	CYL 4 MISFIRE	—	1 or 2	×	B	EC-247	M
P0327	0327	KNOCK SEN/CIRC-B1	—	2	—	—	EC-253	
P0328	0328	KNOCK SEN/CIRC-B1	—	2	—	—	EC-253	N
P0335	0335	CKP SEN/CIRCUIT	—	2	×	B	EC-257	
P0340	0340	CMP SEN/CIRC-B1	—	2	×	B	EC-262	O
P0420	0420	TW CATALYST SYS-B1	×	2	×	A	EC-267	
P0441	0441	EVAP PURG FLOW/MON	×	2	×	A	EC-272	P
P0442	0442	EVAP SMALL LEAK	×	2	×	A	EC-278	
P0443	0443	PURG VOLUME CONT/V	—	2	×	A	EC-285	
P0444	0444	PURG VOLUME CONT/V	—	2	×	B	EC-291	
P0445	0445	PURG VOLUME CONT/V	—	2	×	B	EC-291	
P0447	0447	VENT CONTROL VALVE	—	2	×	B	EC-295	
P0448	0448	VENT CONTROL VALVE	—	2	×	B	EC-300	
P0451	0451	EVAP SYS PRES SEN	—	2	×	A	EC-306	
P0452	0452	EVAP SYS PRES SEN	—	2	×	B	EC-309	
P0453	0453	EVAP SYS PRES SEN	—	2	×	B	EC-316	
P0455	0455	EVAP GROSS LEAK	—	2	×	A	EC-323	
P0456	0456	EVAP VERY SML LEAK	x*7	2	×	A	EC-329	

ECM

< ECU DIAGNOSIS >

[HR16DE]

DTC*1		Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Permanent DTC group*4	Reference page
CONSULT-III GST*2	ECM*3						
P0460	0460	FUEL LEV SEN SLOSH	—	2	×	A	EC-336
P0461	0461	FUEL LEVEL SENSOR	—	2	×	B	EC-337
P0462	0462	FUEL LEVEL SEN/CIRC	—	2	×	B	EC-339
P0463	0463	FUEL LEVEL SEN/CIRC	—	2	×	B	EC-339
P0500	0500	VEH SPEED SEN/CIRC*6	—	2	×	B	EC-341
P0506	0506	ISC SYSTEM	—	2	×	B	EC-343
P0507	0507	ISC SYSTEM	—	2	×	B	EC-345
P0603	0603	ECM BACK UP/CIRCUIT	—	2	×	B	EC-347
P0605	0605	ECM	—	1 or 2	× or —	B	EC-349
P0607	0607	ECM	—	1 (A/T) 2 (M/T)	× (A/T) — (M/T)	B	EC-351
P0643	0643	SENSOR POWER/CIRC	—	1	×	B	EC-352
P0705	0705	T/M RANGE SENSOR A	—	2	×	B	AT-90
P0710	0710	FLUID TEMP SENSOR A*9	—	2	×	B	AT-95
P0720	0720	OUTPUT SPEED SENSOR*6	—	2	×	B	AT-100
P0725	0725	ENGINE SPEED	—	2	×	B	AT-105
P0731	0731	1GR INCORRECT RATIO*9	—	2	×	B	AT-109
P0732	0732	2GR INCORRECT RATIO*9	—	2	×	B	AT-112
P0733	0733	3GR INCORRECT RATIO*9	—	2	×	B	AT-115
P0734	0734	4GR INCORRECT RATIO*9	—	2	×	B	AT-118
P0740	0740	TORQUE CONVERTER	—	2	×	B	AT-123
P0744	0744	TORQUE CONVERTER	—	2	×	B	AT-128
P0745	0745	PC SOLENOID A	—	2	×	B	AT-133
P0750	0750	SHIFT SOLENOID A	—	1	×	B	AT-138
P0755	0755	SHIFT SOLENOID B	—	1	×	B	AT-143
P0850	0850	P-N POS SW/CIRCUIT	—	2	×	B	EC-356
P1148	1148	CLOSED LOOP-B1	—	1	×	A	EC-361
P1217	1217	ENG OVER TEMP	—	1	×	B	EC-362
P1225	1225	CTP LEARNING-B1	—	2	—	—	EC-366
P1226	1226	CTP LEARNING-B1	—	2	—	—	EC-368
P1421	1421	COLD START CONTROL	—	2	×	A	EC-370
P1610	1610	LOCK MODE	—	2	—	—	BL-259
P1611	1611	ID DISCORD, IMMU-ECM	—	2	—	—	BL-259
P1612	1612	CHAIN OF ECM-IMMU	—	2	—	—	BL-259
P1613	1613	ECM INT CIRC-IMMC	—	2	—	—	BL-259
P1614	1614	CHAIN OF IMMU-KEY	—	2	—	—	BL-259
P1615	1615	DIFFERENCE OF KEY	—	2	—	—	BL-259
P1715	1715	IN PULY SPEED	—	2	—	—	EC-372
P1760	1760	OVER CLUTCH SOLENOID	—	2	×	B	AT-148
P1805	1805	BRAKE SW/CIRCUIT	—	2	—	—	EC-373
P2100	2100	ETC MOT PWR-B1	—	1	×	B	EC-377
P2101	2101	ETC FNCTN/CIRC-B1	—	1	×	B	EC-381

DTC*1		Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Permanent DTC group*4	Reference page
CONSULT-III GST*2	ECM*3						
P2103	2103	ETC MOT PWR	—	1	×	B	EC-377
P2118	2118	ETC MOT-B1	—	1	×	B	EC-386
P2119	2119	ETC ACTR-B1	—	1	×	B	EC-390
P2122	2122	APP SEN 1/CIRC	—	1	×	B	EC-392
P2123	2123	APP SEN 1/CIRC	—	1	×	B	EC-392
P2127	2127	APP SEN 2/CIRC	—	1	×	B	EC-396
P2128	2128	APP SEN 2/CIRC	—	1	×	B	EC-396
P2135	2135	TP SENSOR-B1	—	1	×	B	EC-401
P2138	2138	APP SENSOR	—	1	×	B	EC-405
P2A00	2A00	A/F SENSOR1 (B1)	—	2	×	A	EC-410

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012/ISO 15031-6.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: Refer to [EC-84, "Diagnosis Description"](#), "PERMANENT DIAGNOSTIC TROUBLE CODE (PERMANENT DTC)".

*5: The troubleshooting for this DTC needs CONSULT-III.

*6: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

*7: SRT code will not be set if the self-diagnostic result is NG.

*8: When the ECM is in the mode that displays SRT status, MIL may flash. For the details, refer to "How to Display SRT Status" in [EC-84, "Diagnosis Description"](#).

*9: When erasing this DTC, always use CONSULT-III or GST.

How to Set SRT Code

INFOID:000000005656812

To set all SRT codes, self-diagnoses for the SRT items must be performed one or more times. Refer to [EC-84, "Diagnosis Description"](#), "SYSTEM READINESS TEST (SRT) CODE", "SRT Item".

Each diagnosis may require a long period of actual driving under various conditions.

WITH CONSULT-III

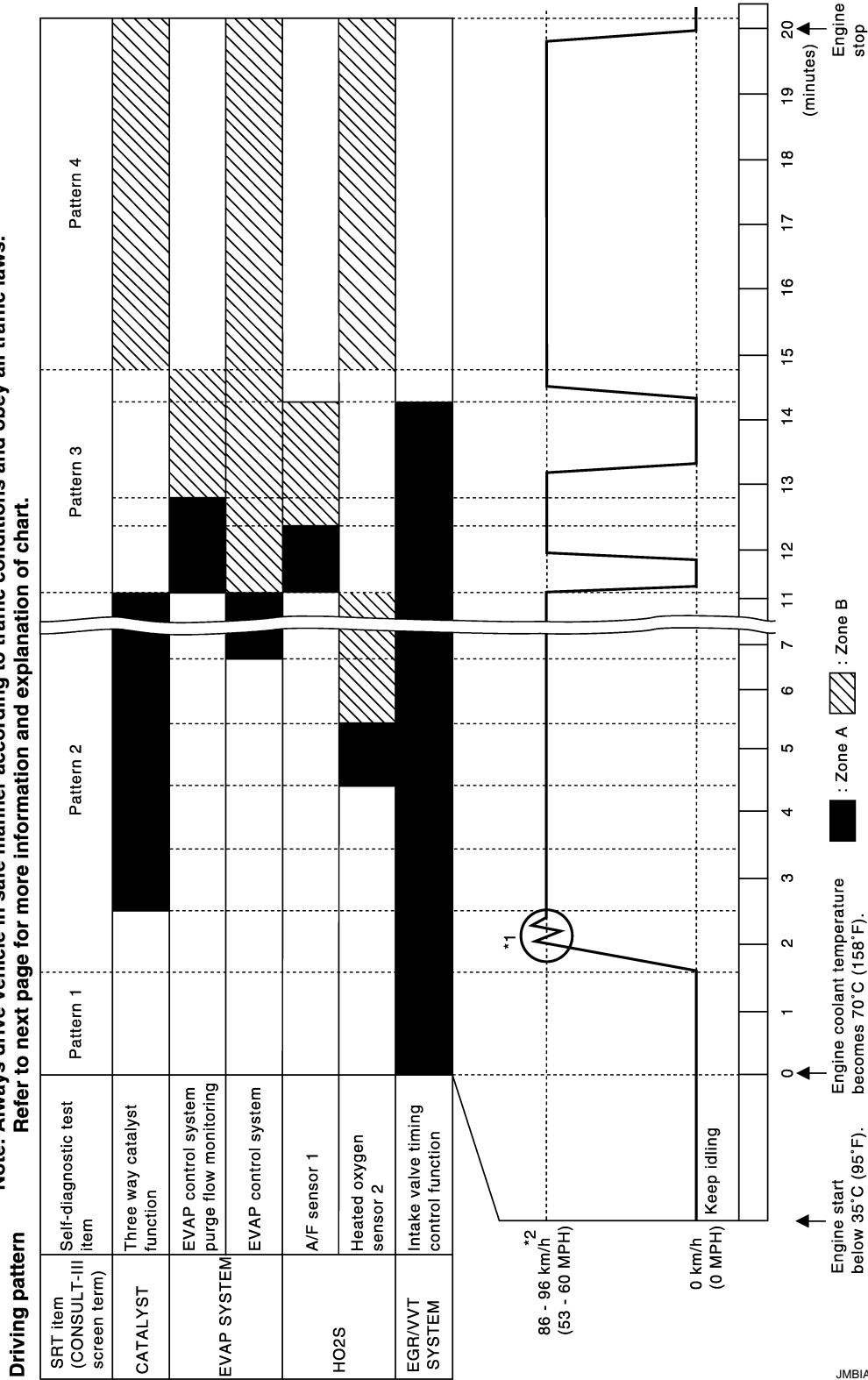
Perform corresponding DTC CONFIRMATION PROCEDURE one by one based on Performance Priority in the table on "SRT Item".

WITHOUT CONSULT-III

The most efficient driving pattern in which SRT codes can be properly set is explained below. The driving pattern should be performed one or more times to set all SRT codes.

DRIVING PATTERN

Note: Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. Refer to next page for more information and explanation of chart.



JMBIA2929GB

- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
 - Zone A refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.
 - Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.
- *: Normal conditions refer to the following:

< ECU DIAGNOSIS >

- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

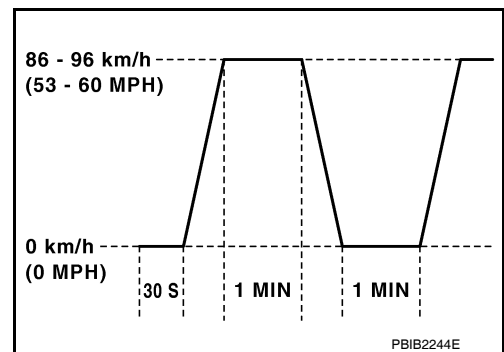
- **The engine is started at the engine coolant temperature of -10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 38 and ground is 3.0 - 4.3 V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 38 and ground is lower than 1.4 V).**
- **The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 43 and ground is less than 4.1 V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during decelerating vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).



Pattern 4:

- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted again.

*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

*2: Checking the vehicle speed with GST is advised.

Suggested Transmission Gear Position for A/T Models

Set the selector lever in the D position.

Suggested Upshift Speeds for M/T Models

Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

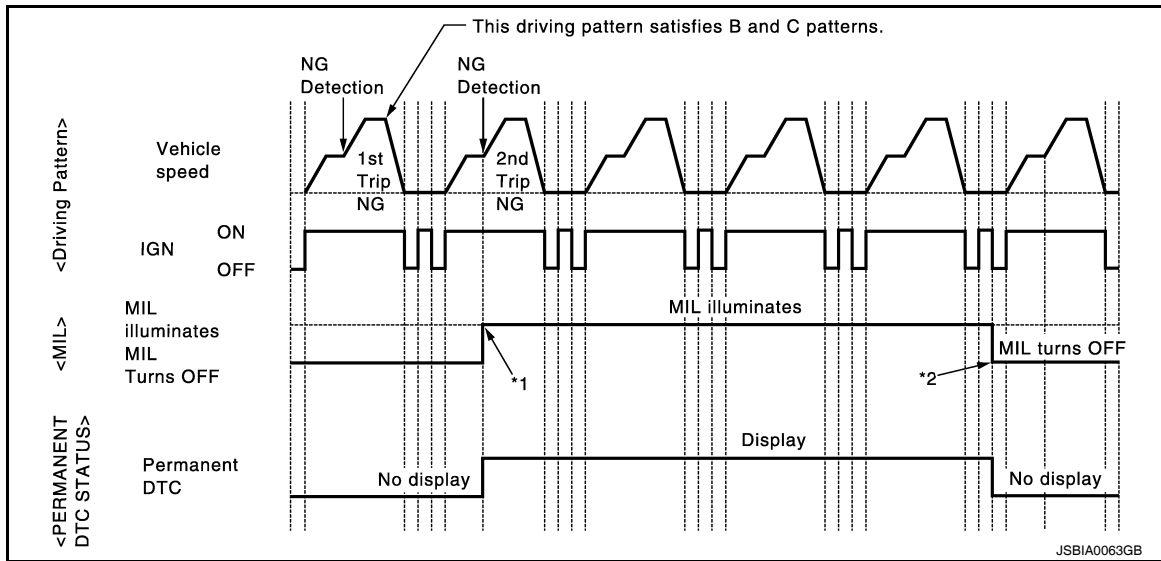
Gear change	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft):		For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft):
	ACCEL shift position [km/h (MPH)]	CRUISE shift point [km/h (MPH)]	km/h (MPH)
1st to 2nd	15 (9)	21 (13)	15 (9)
2nd to 3rd	25 (16)	38 (24)	30 (19)
3rd to 4th	40 (25)	55 (34)	45 (28)
4th to 5th	45 (28)	74 (46)	50 (31)

How to Erase Permanent DTC

INFOID:000000005647832

When a DTC is stored in ECM

When a DTC is stored in ECM and MIL is ON, a permanent DTC is erased with MIL shutoff if the same malfunction is not detected after performing the driving pattern for MIL shutoff three times in a row.



*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.

*2: MIL will turn off after vehicle is driven 3 times (pattern B) without any malfunctions.

When a DTC is not stored in ECM

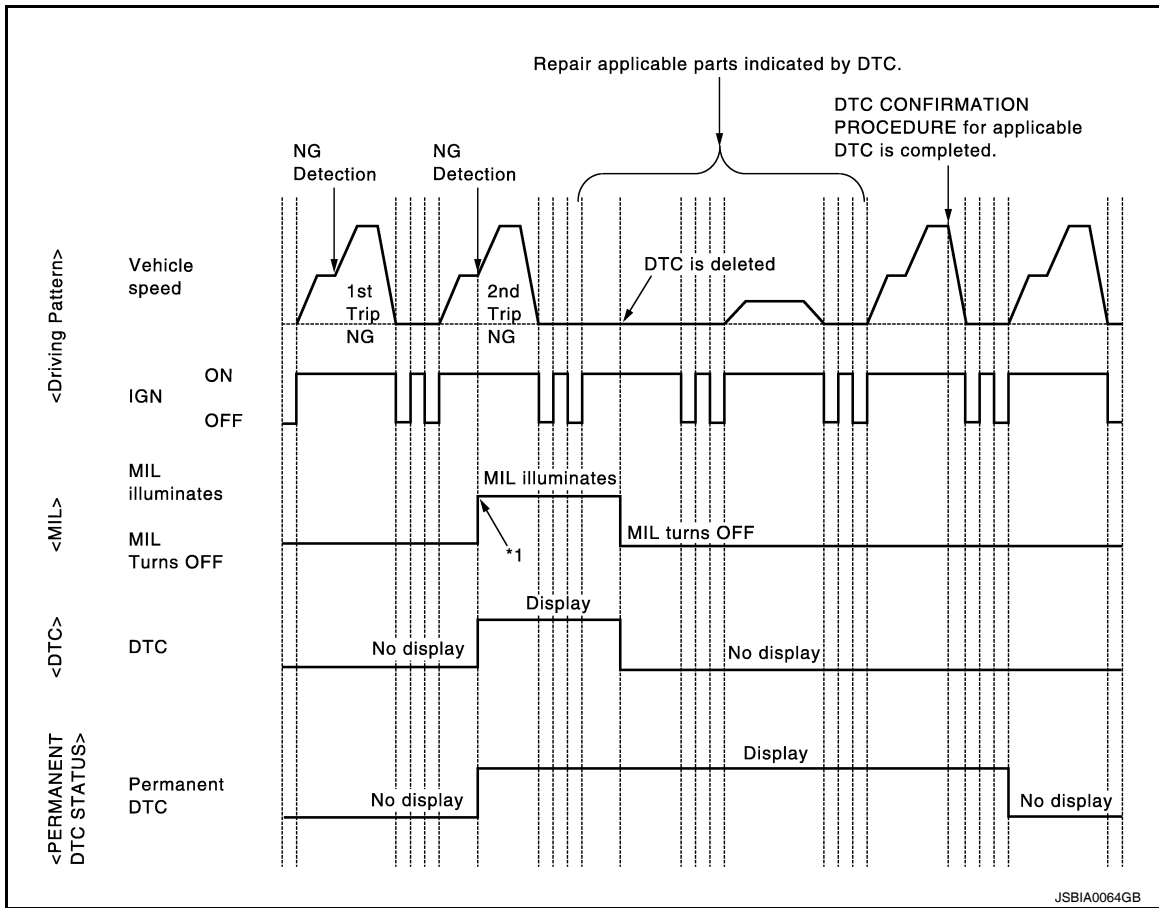
The erasing method depends on a permanent DTC stored in ECM. Refer to the following table.

×: Applicable —: Not applicable

Group*	Perform "DTC CONFIRMATION PROCEDURE" for applicable DTCs.	Driving pattern	
		B	D
A	×	—	—
B	—	×	×

*: For group, refer to [EC-468, "DTC Index"](#).

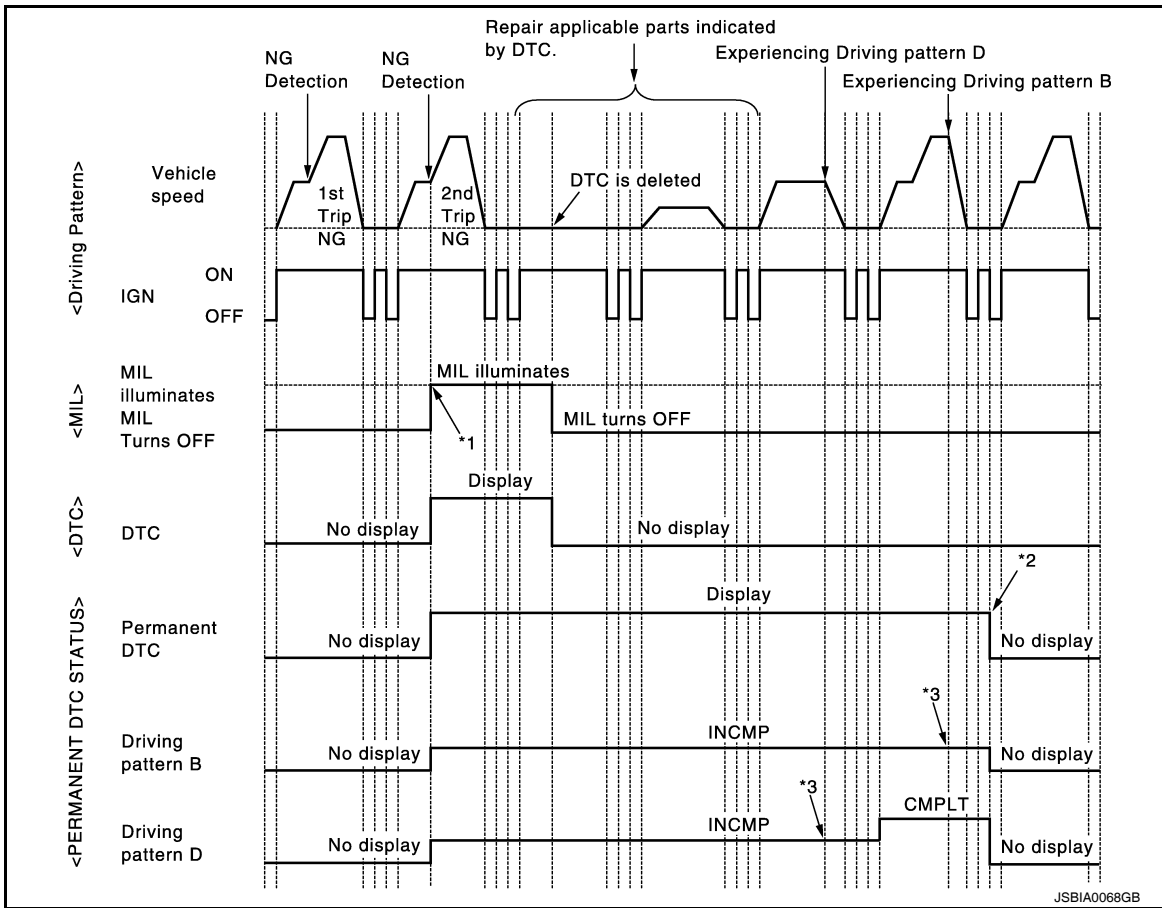
Group A



*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Check permanent DTC. Refer to [EC-84, "Diagnosis Description"](#).
6. Perform "DTC CONFIRMATION PROCEDURE" for DTCs which are the same as permanent DTCs stored in ECM.
7. Turn ignition switch OFF and wait at least 10 seconds.
8. Turn ignition switch ON.
9. Turn ignition switch OFF and wait at least 10 seconds.
10. Turn ignition switch ON.
11. Check permanent DTC. Refer to [EC-84, "Diagnosis Description"](#).
12. Check that the permanent DTCs have been erased.

Group B



*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.

*2: After experiencing Driving pattern B and D, permanent DTC is erased.

*3: Indication does not change unless the ignition switch is turned from ON to OFF twice even after experiencing Driving pattern B or D.

NOTE:

- Drive the vehicle according to only driving patterns indicating "INCMP" in driving patterns B and D on the "PERMANENT DTC STATUS" screen.
- When experiencing both driving pattern B and D during the same trip, the experience of driving pattern D is counted by priority.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Check permanent DTC. Refer to [EC-84. "Diagnosis Description"](#).
6. Start engine and warm it up to normal operating temperature.
7. Drive the vehicle according to driving pattern D.

CAUTION:

- Always drive at a safe speed.
 - Never erase self-diagnosis results.
 - If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B or D is reset.
 - If self-diagnosis results are erased during the trip of driving pattern B or D, an experience of driving pattern B and D during the same trip is not counted up.
8. Turn ignition switch OFF and wait at least 10 seconds.
 9. Turn ignition switch ON.
 10. Turn ignition switch OFF and wait at least 10 seconds.

< ECU DIAGNOSIS >

11. Turn ignition switch ON.
12. Use "PERMANENT DTC WORK SUPPORT" to drive the vehicle according to driving pattern B.
 - CAUTION:**
 - Always drive at a safe speed.
 - Never erase self-diagnosis results.
 - If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B or D is reset.
 - If self-diagnosis results are erased during the trip of driving pattern B or D, an experience of driving pattern B and D during the same trip is not counted up.
13. Turn ignition switch OFF and wait at least 10 seconds.
14. Turn ignition switch ON.
15. Turn ignition switch OFF and wait at least 10 seconds.
16. Turn ignition switch ON.
17. Check permanent DTC. Refer to [EC-84, "Diagnosis Description"](#).
18. Check that the permanent DTCs have been erased.

DRIVING PATTERN

Driving Pattern B

Driving pattern B means a trip satisfying the following conditions.

- Engine speed reaches 400 rpm or more.
- Water temperature reaches 70°C (158°F) or more.
- Vehicle speed of 70 – 120 km/h (44 – 75 MPH) is maintained for 60 seconds or more under the control of closed loop.
- Vehicle speed of 30 – 60 km/h (19 – 37 MPH) is maintained for 10 seconds or more under the control of closed loop.
- Under the closed loop control condition, the following state reaches 12 seconds or more in total: Vehicle speed of 4 km/h (2 MPH) or less with idling condition.
- The state of driving at 10 km/h (7 MPH) or more reaches 10 minutes or more in total.
- A lapse of 22 minutes or more after engine start.

CAUTION:

Always drive at a safe speed.

NOTE:

- Drive the vehicle at a constant velocity.
- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern B.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern B.

Driving Pattern D

Driving pattern D means operating vehicle as per the following.

- The state of driving at 40 km/h (25 MPH) reaches 300 seconds or more in total.
- Idle speed lasts 30 seconds or more.
- A lapse of 600 seconds or more after engine start.

CAUTION:

Always drive at a safe speed.

NOTE:

- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern D.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern D.

Test Value and Test Limit

INFOID:000000005653465

The following is the information specified in Service \$06 of SAE J1979/ISO 15031-5.

The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

These data (test value and test limit) are specified by On Board Monitor ID (OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.

ECM

< ECU DIAGNOSIS >

[HR16DE]

The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (eg., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	01H	Air fuel ratio (A/F) sensor 1 (Bank 1)	P0131	83H	0BH	Minimum sensor output voltage for test cycle
			P0131	84H	0BH	Maximum sensor output voltage for test cycle
			P0130	85H	0BH	Minimum sensor output voltage for test cycle
			P0130	86H	0BH	Maximum sensor output voltage for test cycle
			P0133	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0133	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A00	89H	84H	The amount of shift in air fuel ratio
			P2A00	8AH	84H	The amount of shift in air fuel ratio
			P0130	8BH	0BH	Difference in sensor output voltage
			P0133	8CH	83H	Response gain at the limited frequency
			P014C	8DH	04H	O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 1
			P014C	8EH	04H	O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 1
			P014D	8FH	84H	O2 Sensor Slow Response - Lean to Rich Bank 1 Sensor 1
			P014D	90H	84H	O2 Sensor Slow Response - Lean to Rich Bank 1 Sensor 1
	P015A	91H	01H	O2 Sensor Delayed Response - Rich to Lean Bank 1 Sensor 1		
	P015A	92H	01H	O2 Sensor Delayed Response - Rich to Lean Bank 1 Sensor 1		
	P015B	93H	01H	O2 Sensor Delayed Response - Lean to Rich Bank 1 Sensor 1		
	P015B	94H	01H	O2 Sensor Delayed Response - Lean to Rich Bank 1 Sensor 1		
	02H	Heated oxygen sensor 2 (Bank 1)	P0138	07H	0CH	Minimum sensor output voltage for test cycle
			P0137	08H	0CH	Maximum sensor output voltage for test cycle
P0138			80H	0CH	Sensor output voltage	
P0139			81H	0CH	Difference in sensor output voltage	
03H	Heated oxygen sensor 3 (Bank 1)	P0143	07H	0CH	Minimum sensor output voltage for test cycle	
		P0144	08H	0CH	Maximum sensor output voltage for test cycle	
		P0146	80H	0CH	Sensor output voltage	
		P0145	81H	0CH	Difference in sensor output voltage	

ECM

< ECU DIAGNOSIS >

[HR16DE]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P0151	83H	0BH	Minimum sensor output voltage for test cycle
			P0151	84H	0BH	Maximum sensor output voltage for test cycle
			P0150	85H	0BH	Minimum sensor output voltage for test cycle
			P0150	86H	0BH	Maximum sensor output voltage for test cycle
			P0153	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0153	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A03	89H	84H	The amount of shift in air fuel ratio
			P2A03	8AH	84H	The amount of shift in air fuel ratio
			P0150	8BH	0BH	Difference in sensor output voltage
			P0153	8CH	83H	Response gain at the limited frequency
			P014E	8DH	04H	O2 Sensor Slow Response - Rich to Lean Bank 2 Sensor 1
			P014E	8EH	04H	O2 Sensor Slow Response - Rich to Lean Bank 2 Sensor 1
			P014F	8FH	84H	O2 Sensor Slow Response - Lean to Rich Bank 2 Sensor 1
			P014F	90H	84H	O2 Sensor Slow Response - Lean to Rich Bank 2 Sensor 1
	P015C	91H	01H	O2 Sensor Delayed Response - Rich to Lean Bank 2 Sensor 1		
	P015C	92H	01H	O2 Sensor Delayed Response - Rich to Lean Bank 2 Sensor 1		
	P015D	93H	01H	O2 Sensor Delayed Response - Lean to Rich Bank 2 Sensor 1		
	P015D	94H	01H	O2 Sensor Delayed Response - Lean to Rich Bank 2 Sensor 1		
	06H	Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle
			P0157	08H	0CH	Maximum sensor output voltage for test cycle
P0158			80H	0CH	Sensor output voltage	
P0159			81H	0CH	Difference in sensor output voltage	
07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle	
		P0164	08H	0CH	Maximum sensor output voltage for test cycle	
		P0166	80H	0CH	Sensor output voltage	
		P0165	81H	0CH	Difference in sensor output voltage	

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

ECM

< ECU DIAGNOSIS >

[HR16DE]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
CATALYST	21H	Three way catalyst function (Bank1)	P0420	80H	01H	O2 storage index
			P0420	82H	01H	Switching time lag engine exhaust index value
			P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2423	84H	84H	O2 storage index in HC trap catalyst
	22H	Three way catalyst function (Bank2)	P0430	80H	01H	O2 storage index
			P0430	82H	01H	Switching time lag engine exhaust index value
			P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst
EGR SYSTEM	31H	EGR function	P0400	80H	96H	Low Flow Faults: EGR temp change rate (short term)
			P0400	81H	96H	Low Flow Faults: EGR temp change rate (long term)
			P0400	82H	96H	Low Flow Faults: Difference between max EGR temp and EGR temp under idling condition
			P0400	83H	96H	Low Flow Faults: Max EGR temp
			P1402	84H	96H	High Flow Faults: EGR temp increase rate
VVT SYSTEM	35H	VVT Monitor (Bank1)	P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
	36H	VVT Monitor (Bank2)	P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)

ECM

< ECU DIAGNOSIS >

[HR16DE]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
EVAP SYSTEM	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3BH	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)
	3CH	EVAP control system leak (Very small leak)	P0456	80H	05H	Leak area index (for more than 0.02 inch)
			P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
			P0456	82H	FDH	Internal pressure of EVAP system at the end of monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close
O2 SENSOR HEATER	41H	A/F sensor 1 heater (Bank 1)	Low Input:P0031 High Input:P0032	81H	0BH	Converted value of Heater electric current to voltage
	42H	Heated oxygen sensor 2 heater (Bank 1)	Low Input:P0037 High Input:P0038	80H	0CH	Converted value of Heater electric current to voltage
	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of Heater electric current to voltage
	45H	A/F sensor 1 heater (Bank 2)	Low Input:P0051 High Input:P0052	81H	0BH	Converted value of Heater electric current to voltage
	46H	Heated oxygen sensor 2 heater (Bank 2)	Low Input:P0057 High Input:P0058	80H	0CH	Converted value of Heater electric current to voltage
	47H	Heated oxygen sensor 3 heater (Bank 2)	P0063	80H	0CH	Converted value of Heater electric current to voltage
Secondary Air	71H	Secondary Air system	P0411	80H	01H	Secondary Air Injection System Incorrect Flow Detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary Air Injection System Insufficient Flow
			P2445	82H	01H	Secondary Air Injection System Pump Stuck Off
			P2448	83H	01H	Secondary Air Injection System High Airflow
			Bank1: P2440 Bank2: P2442	84H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2440	85H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2444	86H	01H	Secondary Air Injection System Pump Stuck On
FUEL SYSTEM	81H	Fuel injection system function (Bank 1)	P0171 or P0172	80H	2FH	Long term fuel trim
			P0171 or P0172	81H	24H	The number of lambda control clamped
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim
			P0174 or P0175	81H	24H	The number of lambda control clamped

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

ECM

< ECU DIAGNOSIS >

[HR16DE]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A1H	Multiple Cylinder Misfires	P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second cylinder
			P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000 revolution of the fourth cylinder
			P0305	84H	24H	Misfiring counter at 1000 revolution of the fifth cylinder
			P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder
			P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder
			P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder
			P0300	88H	24H	Misfiring counter at 1000 revolution of the multiple cylinders
			P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder
			P0302	8AH	24H	Misfiring counter at 200 revolution of the second cylinder
			P0303	8BH	24H	Misfiring counter at 200 revolution of the third cylinder
			P0304	8CH	24H	Misfiring counter at 200 revolution of the fourth cylinder
			P0305	8DH	24H	Misfiring counter at 200 revolution of the fifth cylinder
			P0306	8EH	24H	Misfiring counter at 200 revolution of the sixth cylinder
			P0307	8FH	24H	Misfiring counter at 200 revolution of the seventh cylinder
			P0308	90H	24H	Misfiring counter at 200 revolution of the eighth cylinder
			P0300	91H	24H	Misfiring counter at 1000 revolution of the single cylinder
			P0300	92H	24H	Misfiring counter at 200 revolution of the single cylinder
			P0300	93H	24H	Misfiring counter at 200 revolution of the multiple cylinders

ECM

< ECU DIAGNOSIS >

[HR16DE]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A2H	No. 1 Cylinder Misfire	P0301	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0301	0CH	24H	Misfire counts for last/current driving cycles
	A3H	No. 2 Cylinder Misfire	P0302	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0302	0CH	24H	Misfire counts for last/current driving cycles
	A4H	No. 3 Cylinder Misfire	P0303	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0303	0CH	24H	Misfire counts for last/current driving cycles
	A5H	No. 4 Cylinder Misfire	P0304	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0304	0CH	24H	Misfire counts for last/current driving cycles
	A6H	No. 5 Cylinder Misfire	P0305	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0305	0CH	24H	Misfire counts for last/current driving cycles
	A7H	No. 6 Cylinder Misfire	P0306	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0306	0CH	24H	Misfire counts for last/current driving cycles
	A8H	No. 7 Cylinder Misfire	P0307	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0307	0CH	24H	Misfire counts for last/current driving cycles
	A9H	No. 8 Cylinder Misfire	P0308	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0308	0CH	24H	Misfire counts for last/current driving cycles

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[HR16DE]

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:000000005398642

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-428
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-496
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-424
	Evaporative emission system	3	3	4	4	4	4	4	4	4	4	4			EC-68
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4	4	4	1		EC-449
	Incorrect idle speed adjustment						1	1	1	1		1			EC-24
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-381 EC-390
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-24
	Ignition circuit	1	1	2	2	2		2	2			2			EC-434
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-115
Mass air flow sensor circuit		1			2										EC-142 EC-142
Engine coolant temperature sensor circuit							3			3					EC-161 EC-169
Air fuel ratio (A/F) sensor 1 circuit			1	2	3	2		2	2			2			EC-176 EC-182 EC-187 EC-192 EC-410
Throttle position sensor circuit							2			2					EC-165 EC-243 EC-366 EC-368 EC-401
Accelerator pedal position sensor circuit				3	2	1									EC-392 EC-396 EC-405
Knock sensor circuit				2								3			EC-253

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[HR16DE]

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Crankshaft position sensor (POS) circuit	2	2												EC-257
Camshaft position sensor (PHASE) circuit	3	2												EC-262
Vehicle speed signal circuit		2	3		3						3			EC-341
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-347 EC-349
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-138
PNP signal circuit			3		3		3	3			3			EC-356
Refrigerant pressure sensor circuit		2				3			3		4			EC-450
Electrical load signal circuit							3							EC-421
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	MTC-23
ABS actuator and electric unit (control unit)			4											BRC-10

1 - 6: The numbers refer to the order of inspection.

(continued on next table)

SYSTEM — ENGINE MECHANICAL & OTHER

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[HR16DE]

		SYMPTOM													Reference page							
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATSWATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)								
Warranty symptom code		A A	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA								
Fuel	Fuel tank	5													FL-12							
	Fuel piping			5	5	5		5	5			5			FL-5							
	Vapor lock	5	5												—							
	Valve deposit															—						
	Poor fuel (Heavy weight gasoline, Low octane)			5	5	5	5		5	5			5			—						
Air	Air duct	5	5												EM-26							
	Air cleaner																					
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)			5	5	5	5		5	5			5									
	Electric throttle control actuator			5		5		5			5						EM-28					
	Air leakage from intake manifold/Collector/Gasket																					
Cranking	Battery	1	1	1		1		1	1					1	SC-5							
	Generator circuit														SC-21							
	Starter circuit	3										1			SC-9							
	Signal plate	6													EM-90							
	PNP switch (M/T) Transmission range switch (A/T)	4													MT-13 (M/T) AT-94 (A/T)							
Engine	Cylinder head	5	5	5	5	5		5	5			5	3		EM-73							
	Cylinder head gasket															4						
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-90							
	Piston																					
	Piston ring																					
	Connecting rod																					
	Bearing																					
	Crankshaft																					

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[HR16DE]

		SYMPTOM												Reference page	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code		A A	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Valve mechanism	Timing chain														EM-49
	Camshaft														EM-59
	Intake valve timing control	5	5	5	5	5		5	5			5			EM-49
	Intake valve												3		EM-76
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-31 EX-5
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-39 EM-42 LU-7 LU-9
	Oil level (Low)/Filthy oil														LU-7
Cooling	Radiator/Hose/Radiator filler cap														CO-15 CO-15
	Thermostat									5					CO-24
	Water pump	5	5	5	5	5		5	5		4	5		CO-22	
	Water gallery														CO-10
	Cooling fan														CO-20
	Coolant level (Low)/Contaminated coolant									5					CO-10
NVIS (NISSAN Vehicle Immobilizer System — NATS)		1	1												BL-257

1 - 6: The numbers refer to the order of inspection.

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

NORMAL OPERATING CONDITION

Description

INFOID:000000005398643

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,500 rpm under no load (for example, the selector lever position is neutral and engine speed is over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 2,000 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, [EC-36](#), "[System Description](#)".

PRECAUTION**PRECAUTIONS****Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"**

INFOID:000000006046361

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS**WARNING:**

- When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the Ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the Ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:000000006046362

NOTE:

- This Procedure is applied only to models with Intelligent Key system and NATS (NISSAN ANTI-THEFT SYSTEM).
- Remove and install all control units after disconnecting both battery cables with the ignition knob in the "LOCK" position.
- Always use CONSULT-III to perform self-diagnosis as a part of each function inspection after finishing work. If DTC is detected, perform trouble diagnosis according to self-diagnostic results.

For models equipped with the Intelligent Key system and NATS, an electrically controlled steering lock mechanism is adopted on the key cylinder.

For this reason, if the battery is disconnected or if the battery is discharged, the steering wheel will lock and steering wheel rotation will become impossible.

If steering wheel rotation is required when battery power is interrupted, follow the procedure below before starting the repair operation.

OPERATION PROCEDURE

1. Connect both battery cables.

NOTE:

Supply power using jumper cables if battery is discharged.

2. Use the Intelligent Key or mechanical key to turn the ignition switch to the "ACC" position. At this time, the steering lock will be released.
3. Disconnect both battery cables. The steering lock will remain released and the steering wheel can be rotated.
4. Perform the necessary repair operation.

PRECAUTIONS

[HR16DE]

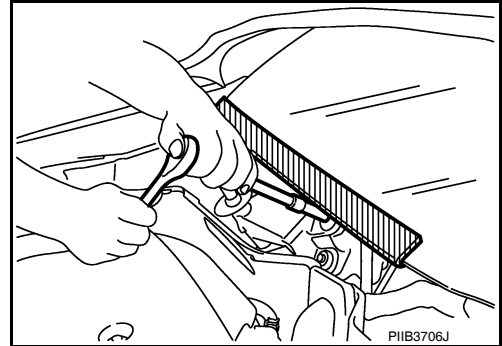
< PRECAUTION >

5. When the repair work is completed, return the ignition switch to the "LOCK" position before connecting the battery cables. (At this time, the steering lock mechanism will engage.)
6. Perform a self-diagnosis check of all control units using CONSULT-III.

Precaution for Procedure without Cowl Top Cover

INFOID:0000000055662058

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



On Board Diagnosis (OBD) System of Engine and A/T

INFOID:000000005398646

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

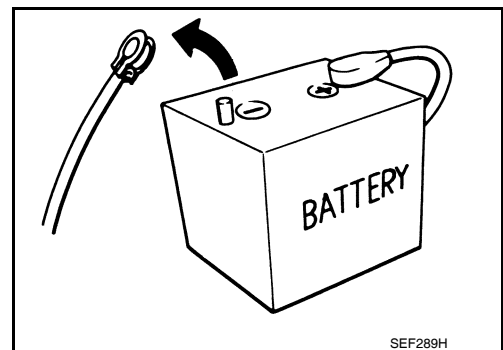
CAUTION:

- Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to [PG-66, "Description"](#).
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EVAP system or fuel injection system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

General Precautions

INFOID:000000005398647

- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- Before removing parts, turn ignition switch OFF and then disconnect negative battery cable.



PRECAUTIONS

[HR16DE]

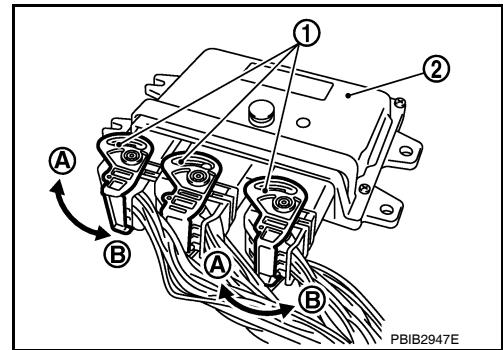
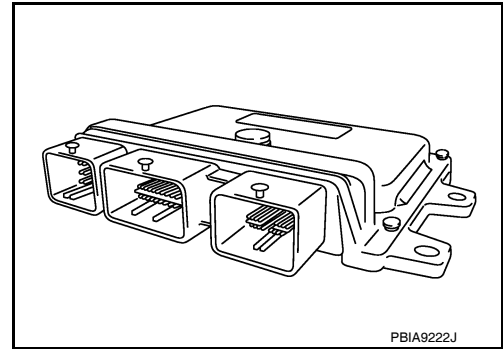
< PRECAUTION >

- Do not disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.

The ECM will now start to self-control at its initial value. Thus, engine operation can vary slightly in this case. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.

- If the battery is disconnected, the following emission-related diagnostic information will be cleared within 24 hours.
 - Diagnostic trouble codes
 - 1st trip diagnostic trouble codes
 - Freeze frame data
 - 1st trip freeze frame data
 - System readiness test (SRT) codes
 - Test values
- When connecting ECM harness connector (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.

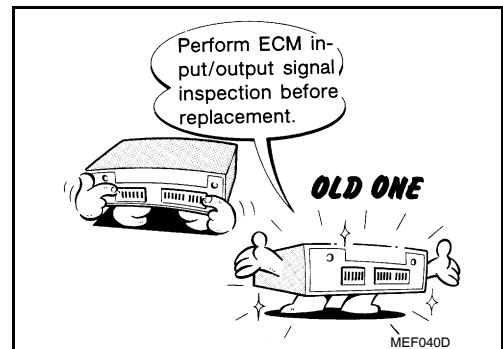
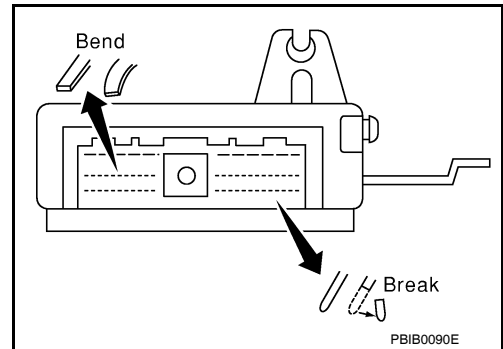
- 2. ECM
- A. Loosen



- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).

Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.

- Securely connect ECM harness connectors.
A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harness dry.
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to [EC-454, "Reference Value"](#).
- Handle mass air flow sensor carefully to avoid damage.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).

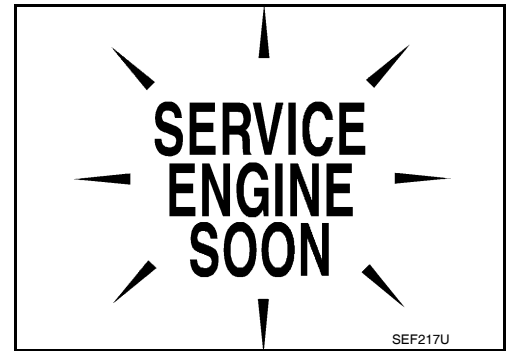


PRECAUTIONS

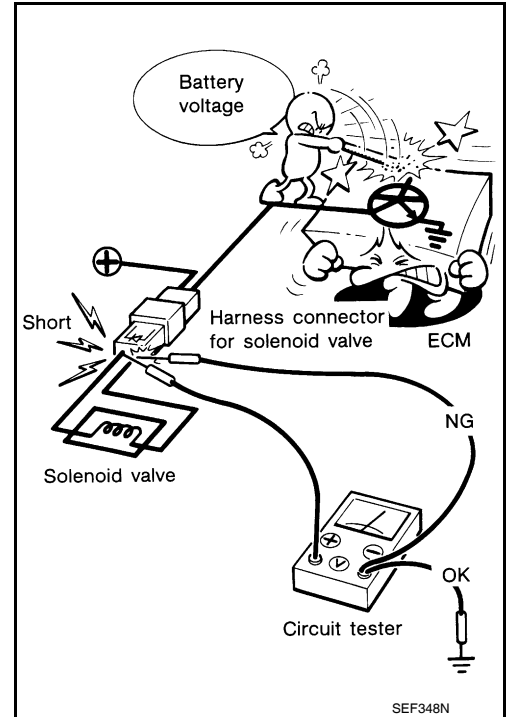
[HR16DE]

< PRECAUTION >

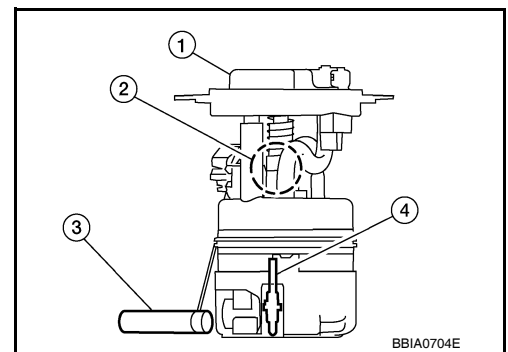
- After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check. The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.



- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.
- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel level sensor (3)
- Fuel tank temperature sensor (4)

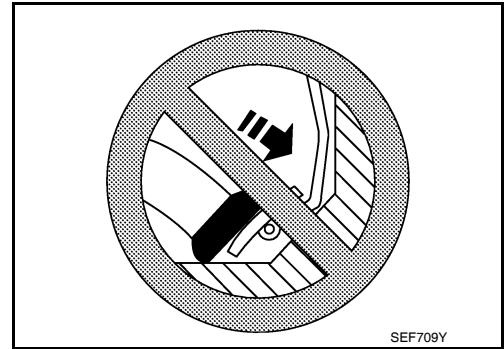


PRECAUTIONS

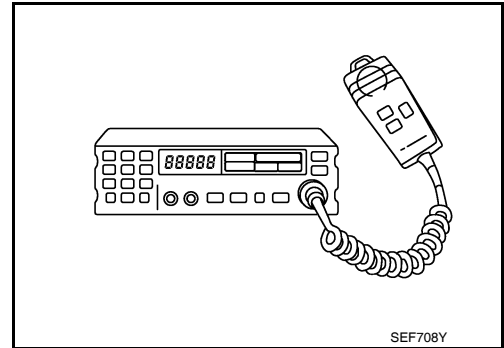
[HR16DE]

< PRECAUTION >

- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.



- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.
 - Keep the antenna as far as possible from the electronic control units.
 - Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls. Do not let them run parallel for a long distance.
 - Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
 - Be sure to ground the radio to vehicle body.



A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

PREPARATION

< PREPARATION >

[HR16DE]

PREPARATION

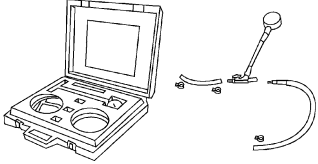
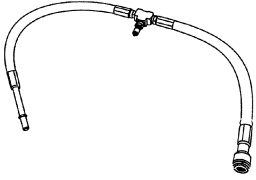
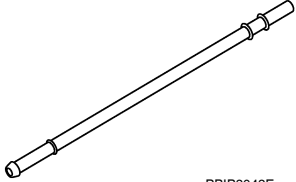
PREPARATION

Special Service Tools

INFOID:000000005398648

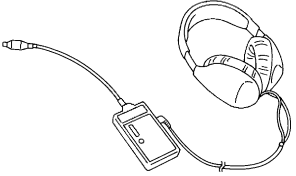
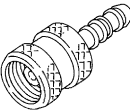
NOTE:

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
(J-44321) Fuel pressure gauge kit  <p style="text-align: center;">LEC642</p>	Checks fuel pressure
(J-44321-6) Fuel pressure adapter  <p style="text-align: center;">LBIA0376E</p>	Connects fuel pressure gauge to quick connector type fuel lines.
KV10118400 Fuel tube adapter  <p style="text-align: center;">PBIB3043E</p>	Measures fuel pressure

Commercial Service Tools

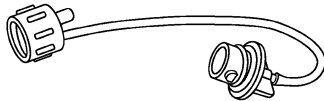
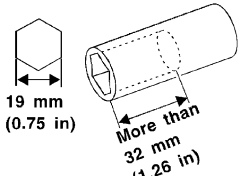
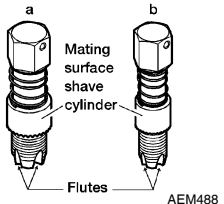

INFOID:000000005398649

Tool name (Kent-Moore No.)	Description
Leak detector i.e.: (J-41416)  <p style="text-align: center;">S-NT703</p>	Locates the EVAP leak
EVAP service port adapter i.e.: (J-41413-OBD)  <p style="text-align: center;">S-NT704</p>	Applies positive pressure through EVAP service port

PREPARATION

< PREPARATION >

[HR16DE]

Tool name (Kent-Moore No.)	Description	A
Fuel filler cap adapter i.e.: (MLR-8382) <div style="text-align: center;">  <p>S-NT815</p> </div>	Checks fuel tank vacuum relief valve opening pressure	EC
Socket wrench <div style="text-align: center;">  <p>S-NT705</p> </div>	Removes and installs engine coolant temperature sensor	C D E
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12) <div style="text-align: center;">  <p>AEM488</p> </div>	Reconditions the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Titanium Oxygen Sensor	F G H
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907) <div style="text-align: center;">  <p>S-NT779</p> </div>	Lubricates oxygen sensor thread cleaning tool when reconditioning exhaust system threads.	I J K

ON-VEHICLE MAINTENANCE

FUEL PRESSURE

Inspection

INFOID:000000005398650

FUEL PRESSURE RELEASE

④ With CONSULT-III

1. Turn ignition switch ON.
2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT-III.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.

⊗ Without CONSULT-III

1. Remove fuel pump fuse located in IPDM E/R.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.

FUEL PRESSURE CHECK

CAUTION:

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

NOTE:

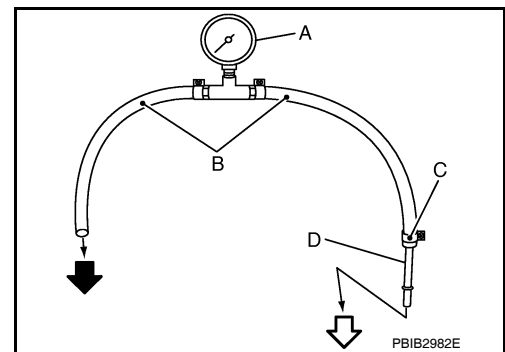
- Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because C11 models do not have fuel return system.
- The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.
- Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains seal ability with O-rings inside.
- Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.

1. Release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".

2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.

- ⇐: To quick connector
- ←: To fuel tube (engine side)
- C: Clamp
- Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
- To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
- Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
- Use Pressure Gauge to check fuel pressure.

3. Remove fuel hose. Refer to [EM-152, "Removal and Installation"](#).
 - Do not twist or kink fuel hose because it is plastic hose.

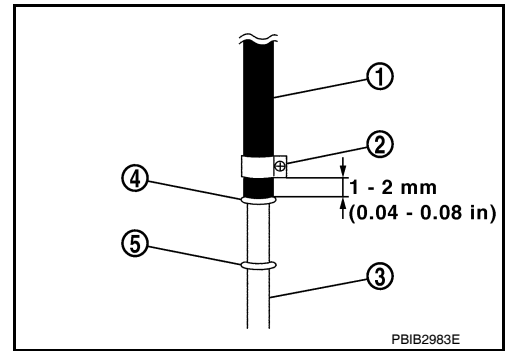


FUEL PRESSURE

[HR16DE]

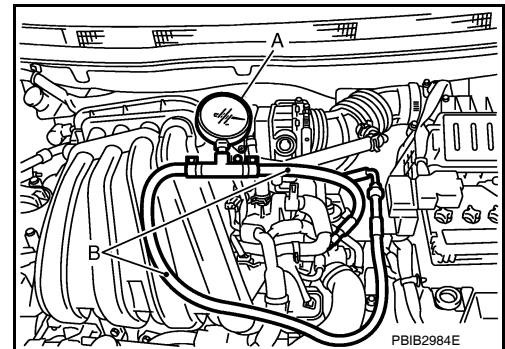
< ON-VEHICLE MAINTENANCE >

4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
 - No.2 spool (5)
 - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
 - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
 - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
 - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
 - When reconnecting fuel line, always use new clamps.
 - Use a torque driver to tighten clamps.
 - Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).



Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg·m, 9 - 13 in·lb)

- Make sure that clamp screw does not contact adjacent parts.
5. Connect fuel tube adapter to quick connector.
 - A: Fuel pressure gauge
 - B: Fuel hose for fuel pressure check
 6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
 7. Turn ignition switch ON and check for fuel leakage.
 8. Start engine and check for fuel leakage.
 9. Read the indication of fuel pressure gauge.
 - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
 - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.



At idling: Approximately 350 kPa (3.57 kg/cm², 51 psi)

10. If result is unsatisfactory, go to next step.
11. Check the following.
 - Fuel hoses and fuel tubes for clogging
 - Fuel filter for clogging
 - Fuel pump
 - Fuel pressure regulator for cloggingIf OK, replace fuel pressure regulator.
If NG, repair or replace.
12. Before disconnecting Fuel Pressure Gauge and Fuel Pressure Adapter J-44321-6, release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".

EVAP LEAK CHECK

< ON-VEHICLE MAINTENANCE >

[HR16DE]

EVAP LEAK CHECK

Inspection

INFOID:000000005398651

CAUTION:

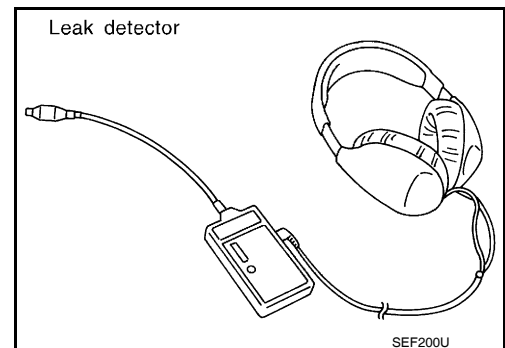
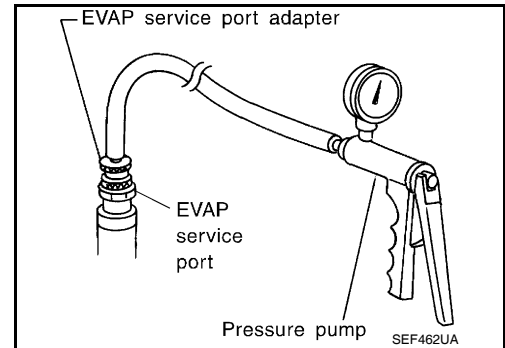
- Do not use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system.

NOTE:

- Do not start engine.
- Improper installation of EVAP service port adapter [commercial service tool: (J-41413-OBDD)] to the EVAP service port may cause a leak.

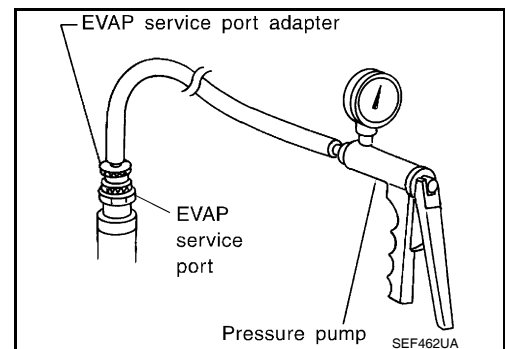
Ⓟ WITH CONSULT-III

1. Install EVAP service port adapter [commercial service tool: (J-41413-OBDD)] and pressure pump to EVAP service port.
2. Turn ignition switch ON.
3. Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-III.
4. Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
5. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
6. Remove EVAP service port adapter [commercial service tool: (J-41413-OBDD)] and hose with pressure pump.
7. Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to [EC-68. "System Description"](#).



ⓧ WITHOUT CONSULT-III

1. Install EVAP service port adapter [commercial service tool: (J-41413-OBDD)] and pressure pump to EVAP service port.
2. Apply battery voltage between the terminals of EVAP canister vent control valve to make a closed EVAP system.
3. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm², 0.2 to 0.4 psi).
4. Remove EVAP service port adapter [commercial service tool: (J-41413-OBDD)] and hose with pressure pump.

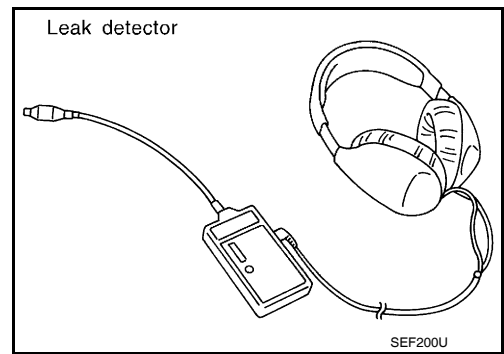


EVAP LEAK CHECK

< ON-VEHICLE MAINTENANCE >

[HR16DE]

5. Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to [EC-68, "System Description"](#).



A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

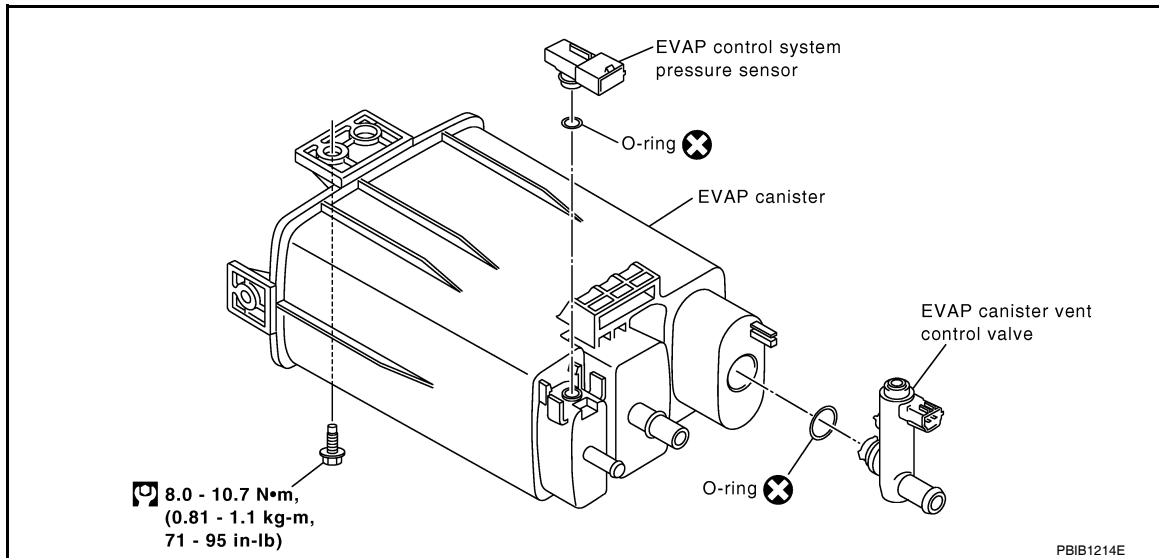
P

ON-VEHICLE REPAIR

EVAP CANISTER

Exploded View

INFOID:000000005398652



Removal and Installation

INFOID:000000005398653

EVAP CANISTER

Removal

1. Remove EVAP canister protector.
2. Disconnect the EVAP control pressure sensor connector.
3. Remove the EVAP control pressure sensor and O-ring, if necessary.
4. Disconnect EVAP canister purge hose.
5. Remove the EVAP canister retaining bolt.
6. Disconnect fuel tank EVAP breather hose.
7. Disconnect EVAP vent control valve connector.
8. Disconnect the EVAP vent control valve hose.
9. Remove the EVAP canister.
10. Remove the EVAP vent control valve and O-ring, if necessary.

Installation

Installation is in the reverse order of removal.

CAUTION:

Always replace O-rings with a new one.

EVAP CANISTER CONTROL PRESSURE SENSOR

Removal

1. Remove EVAP canister protector.
2. Disconnect the EVAP control pressure sensor connector.
3. Remove the EVAP canister control pressure sensor and O-ring.

Installation

Installation is in the reverse order of removal.

CAUTION:

Always replace O-ring with a new one.

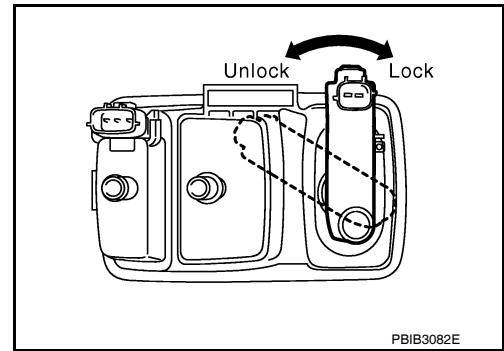
EVAP CANISTER VENT CONTROL VALVE

EVAP CANISTER

[HR16DE]

< ON-VEHICLE REPAIR >

1. Remove EVAP canister protector.
2. Disconnect EVAP vent control valve connector.
3. Disconnect the EVAP vent control valve hose.
4. Turn EVAP canister vent control valve counterclockwise.
5. Remove the EVAP canister vent control valve.



Installation

Installation is in the reverse order of removal.

CAUTION:

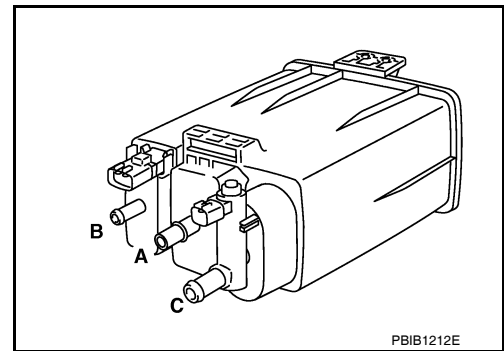
Always replace O-ring with a new one.

Inspection

INFOID:000000005398654

Check EVAP canister as per the following:

1. Block port (B).
2. Blow air into port (A) and confirm that it flows freely out of port (C).
3. Release blocked port (B).
4. Apply vacuum pressure to port (B) and confirm that vacuum pressure exists at the ports (A) and (C).
5. Block port (A) and (B).
6. Apply pressure to port (C) and check that there is no leakage.



A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[HR16DE]

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:000000005398655

Transmission	Condition	Specification
A/T	No load* (in P or N position)	700 ± 50 rpm
M/T	No load* (in Neutral position)	650 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Timing

INFOID:000000005398656

Transmission	Condition	Specification
A/T	No load* (in P or N position)	6 ± 5°BTDC
M/T	No load* (in Neutral position)	6 ± 5°BTDC

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

INFOID:000000005398657

Condition	Specification (Using CONSULT-III or GST)
At idle	10 – 35 %
At 2,500 rpm	10 – 35 %

Mass Air Flow Sensor

INFOID:000000005398658

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	0.9 – 1.3V*
Mass air flow (Using CONSULT-III or GST)	1.0 – 4.0 g·m/sec at idle* 2.0 – 10.0 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.

INDEX FOR DTC

< SERVICE INFORMATION >

[MR18DE]

SERVICE INFORMATION

INDEX FOR DTC

U0101-U1001

INFOID:000000005532361

A

EC

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
U0101	0101*4	LOST COMM (TCM)	EC-639
U0140	0140*4	LOST COMM (BCM)	EC-641
U1001	1001*4	CAN COMM CIRCUIT	EC-643

C

D

E

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012/ISO 15031-6.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: The troubleshooting for this DTC needs CONSULT-III.

F

P0011-P0075

INFOID:000000005532362

G

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0011	0011	INT/V TIM CONT-B1	EC-645
P0031	0031	A/F SEN1 HTR (B1)	EC-649
P0032	0032	A/F SEN1 HTR (B1)	EC-649
P0037	0037	HO2S2 HTR (B1)	EC-654
P0038	0038	HO2S2 HTR (B1)	EC-654
P0075	0075	INT/V TIM V/CIR-B1	EC-659

H

I

J

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012/ISO 15031-6.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

K

L

P0101-P0128

INFOID:000000005532363

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0101	0101	MAF SEN/CIRCUIT-B1	EC-664
P0102	0102	MAF SEN/CIRCUIT-B1	EC-672
P0103	0103	MAF SEN/CIRCUIT-B1	EC-672
P0112	0112	IAT SEN/CIRCUIT-B1	EC-679
P0113	0113	IAT SEN/CIRCUIT-B1	EC-679
P0116	0116	ECT SEN/CIRC	EC-683
P0117	0117	ECT SEN/CIRC	EC-683
P0118	0118	ECT SEN/CIRC	EC-683
P0122	0122	TP SEN 2/CIRC-B1	EC-691
P0123	0123	TP SEN 2/CIRC-B1	EC-691
P0125	0125	ECT SENSOR	EC-696

M

N

O

P

INDEX FOR DTC

< SERVICE INFORMATION >

[MR18DE]

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0127	0127	IAT SENSOR-B1	EC-699
P0128	0128	THERMSTAT FNCTN	EC-702

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012/ISO 15031-6.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0130-P0183

INFOID:000000005532364

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0130	0130	A/F SENSOR1 (B1)	EC-704
P0131	0131	A/F SENSOR1 (B1)	EC-710
P0132	0132	A/F SENSOR1 (B1)	EC-716
P0137	0137	HO2S2 (B1)	EC-722
P0138	0138	HO2S2 (B1)	EC-731
P0139	0139	HO2S2 (B1)	EC-741
P014C	014C	A/F SENSOR1 (B1)	EC-750
P014D	014D	A/F SENSOR1 (B1)	EC-750
P015A	015A	A/F SENSOR1 (B1)	EC-750
P015B	015B	A/F SENSOR1 (B1)	EC-750
P0171	0171	FUEL SYS-LEAN-B1	EC-758
P0172	0172	FUEL SYS-RICH-B1	EC-764
P0181	0181	FTT SENSOR	EC-770
P0182	0182	FTT SEN/CIRCUIT	EC-774
P0183	0183	FTT SEN/CIRCUIT	EC-774

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012/ISO 15031-6.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0222-P0420

INFOID:000000005532365

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0222	0222	TP SEN 1/CIRC-B1	EC-778
P0223	0223	TP SEN 1/CIRC-B1	EC-778
P0300	0300	MULTI CYL MISFIRE	EC-783
P0301	0301	CYL 1 MISFIRE	EC-783
P0302	0302	CYL 2 MISFIRE	EC-783
P0303	0303	CYL 3 MISFIRE	EC-783
P0304	0304	CYL 4 MISFIRE	EC-783
P0327	0327	KNOCK SEN/CIRC-B1	EC-789
P0328	0328	KNOCK SEN/CIRC-B1	EC-789

INDEX FOR DTC

< SERVICE INFORMATION >

[MR18DE]

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0335	0335	CKP SEN/CIRCUIT	EC-793
P0340	0340	CMP SEN/CIRC-B1	EC-799
P0420	0420	TW CATALYST SYS-B1	EC-805

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012/ISO 15031-6.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0441-P0463

INFOID:000000005532366

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0441	0441	EVAP PURG FLOW/MON	EC-810
P0442	0442	EVAP SMALL LEAK	EC-815
P0443	0443	PURG VOLUME CONT/V	EC-822
P0444	0444	PURG VOLUME CONT/V	EC-830
P0445	0445	PURG VOLUME CONT/V	EC-830
P0447	0447	VENT CONTROL VALVE	EC-836
P0448	0448	VENT CONTROL VALVE	EC-842
P0451	0451	EVAP SYS PRES SEN	EC-848
P0452	0452	EVAP SYS PRES SEN	EC-851
P0453	0453	EVAP SYS PRES SEN	EC-858
P0455	0455	EVAP GROSS LEAK	EC-866
P0456	0456	EVAP VERY SML LEAK	EC-873
P0460	0460	FUEL LEV SEN SLOSH	EC-881
P0461	0461	FUEL LEVEL SENSOR	EC-883
P0462	0462	FUEL LEVL SEN/CIRC	EC-885
P0463	0463	FUEL LEVL SEN/CIRC	EC-885

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012/ISO 15031-6.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0500-P0643

INFOID:000000005532367

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0500	0500	VEH SPEED SEN/CIRC	EC-887
P0506	0506	ISC SYSTEM	EC-889
P0507	0507	ISC SYSTEM	EC-891
P0605	0605	ECM	EC-893
P0607	0607	ECM	EC-895
P0643	0643	SENSOR POWER/CIRC	EC-896

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012/ISO 15031-6.

INDEX FOR DTC

[MR18DE]

< SERVICE INFORMATION >

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0705-P0734

INFOID:000000005532368

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0705	0705	T/M RANGE SENSOR A	AT-90 (A/T) CVT-62 (CVT)
P0710	0710	FLUID TEMP SENSOR A*4	AT-95 (A/T) CVT-67 (CVT)
P0715	0715	INPUT SPEED SENSOR AC	CVT-72
P0720	0720	OUTPUT SPEED SENSOR	AT-100 (A/T) CVT-76 (CVT)
P0725	0725	ENGINE SPEED	AT-105
P0731	0731	1GR INCORRECT RATIO*4	AT-109
P0732	0732	2GR INCORRECT RATIO*4	AT-112
P0733	0733	3GR INCORRECT RATIO*4	AT-115
P0734	0734	4GR INCORRECT RATIO*4	AT-118

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012/ISO 15031-6.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*3: When erasing this DTC, always use CONSULT-III or GST.

P0740-P0840

INFOID:000000005532369

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0740	0740	TORQUE CONVERTERC	AT-123 (A/T) CVT-84 (CVT)
P0744	0744	TORQUE CONVERTER	AT-128 (A/T) CVT-89 (CVT)
P0745	0745	PC SOLENOID A	AT-133 (A/T) CVT-91 (CVT)
P0746	0746	PC SOLENOID A	CVT-96
P0750	0750	SHIFT SOLENOID A	AT-138
P0755	0755	SHIFT SOLENOID B	AT-143
P0776	0776	PC SOLENOID B	CVT-98
P0778	0778	PC SOLENOID B	CVT-100
P0840	0840	FLUID PRESS SEN/SW A	CVT-105

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012/ISO 15031-6.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

INDEX FOR DTC

< SERVICE INFORMATION >

[MR18DE]

P0850-P1574

INFOID:000000005532370

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0850	0850	P-N POS SW/CIRCUIT	EC-901
P1148	1148	CLOSED LOOP-B1	EC-907
P1211	1211	TCS C/U FUNCTN	EC-908
P1212	1212	TCS/CIRC	EC-909
P1217	1217	ENG OVER TEMP	EC-910
P1225	1225	CTP LEARNING-B1	EC-919
P1226	1226	CTP LEARNING-B1	EC-921
P1421	1421	COLD START CONTROL	EC-923
P1564	1564	ASCD SW	EC-925
P1572	1572	ASCD BRAKE SW	EC-931
P1574	1574	ASCD VHL SPD SEN	EC-940

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012/ISO 15031-6.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P1610-P1615

INFOID:000000005532371

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P1610	1610	LOCK MODE	BL-259
P1611	1611	ID DISCORD,IMMU-ECM	BL-259
P1612	1612	CHAIN OF ECM-IMMU	BL-259
P1614	1614	CHAIN OF IMMU-KEY	BL-259
P1615	1615	DIFFERENCE OF KEY	BL-259

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012/ISO 15031-6.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P1715-P1805

INFOID:000000005532372

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P1715	1715	IN PULY SPEED	EC-942 (A/T) EC-942 (CVT)
P1740	1740	SLCT SOLENOID	CVT-124
P1760	1760	OVER CLUTCH SOLENOID	AT-148
P1777	1777	STEP MOTOR	CVT-129
P1778	1778	STEP MOTOR	CVT-133
P1805	1805	BRAKE SW/CIRCUIT	EC-944

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012/ISO 15031-6.

INDEX FOR DTC

[MR18DE]

< SERVICE INFORMATION >

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P2100-P2A00

INFOID:000000005532373

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P2100	2100	ETC MOT PWR-B1	EC-948
P2101	2101	ETC FNCTN/CIRC-B1	EC-952
P2103	2103	ETC MOT PWR	EC-948
P2118	2118	ETC MOT-B1	EC-958
P2119	2119	ETC ACTR-B1	EC-963
P2122	2122	APP SEN 1/CIRC	EC-965
P2123	2123	APP SEN 1/CIRC	EC-965
P2127	2127	APP SEN 2/CIRC	EC-970
P2128	2128	APP SEN 2/CIRC	EC-970
P2135	2135	TP SENSOR-B1	EC-977
P2138	2138	APP SENSOR	EC-982
P2A00	2A00	A/F SENSOR1 (B1)	EC-989

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012/ISO 15031-6.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:000000006046363

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

- When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the Ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the Ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:000000006046364

NOTE:

- This Procedure is applied only to models with Intelligent Key system and NATS (NISSAN ANTI-THEFT SYSTEM).
- Remove and install all control units after disconnecting both battery cables with the ignition knob in the "LOCK" position.
- Always use CONSULT-III to perform self-diagnosis as a part of each function inspection after finishing work. If DTC is detected, perform trouble diagnosis according to self-diagnostic results.

For models equipped with the Intelligent Key system and NATS, an electrically controlled steering lock mechanism is adopted on the key cylinder.

For this reason, if the battery is disconnected or if the battery is discharged, the steering wheel will lock and steering wheel rotation will become impossible.

If steering wheel rotation is required when battery power is interrupted, follow the procedure below before starting the repair operation.

OPERATION PROCEDURE

1. Connect both battery cables.
 - NOTE:**
Supply power using jumper cables if battery is discharged.
2. Use the Intelligent Key or mechanical key to turn the ignition switch to the "ACC" position. At this time, the steering lock will be released.
3. Disconnect both battery cables. The steering lock will remain released and the steering wheel can be rotated.
4. Perform the necessary repair operation.
5. When the repair work is completed, return the ignition switch to the "LOCK" position before connecting the battery cables. (At this time, the steering lock mechanism will engage.)

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

PRECAUTIONS

< SERVICE INFORMATION >

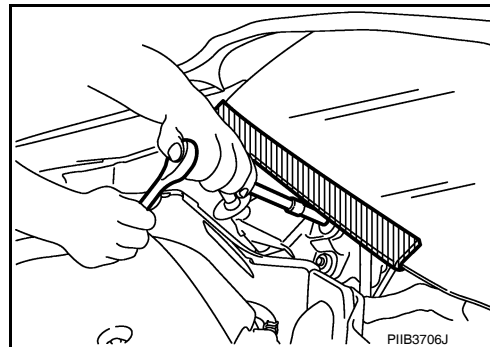
[MR18DE]

6. Perform a self-diagnosis check of all control units using CONSULT-III.

Precaution for Procedure without Cowl Top Cover

INFOID:000000005532375

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



On Board Diagnosis (OBD) System of Engine and A/T, CVT

INFOID:000000005532377

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

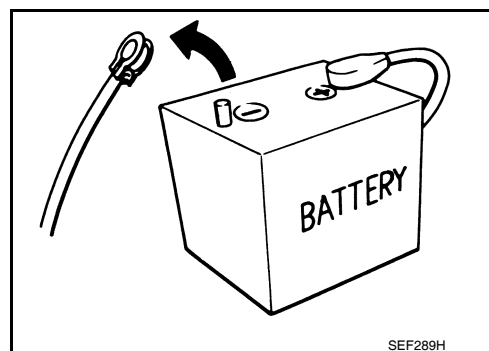
CAUTION:

- Be sure to turn the ignition switch OFF and disconnect the battery ground cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to [PG-66](#).
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the fuel injection system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

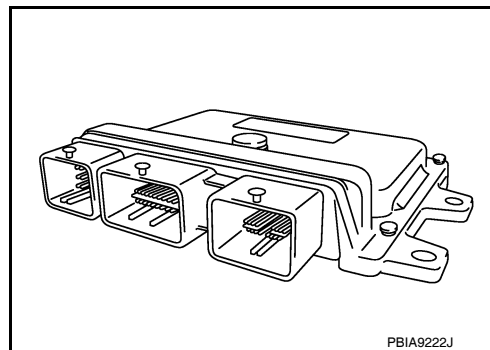
Precaution

INFOID:000000005532377

- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- Before removing parts, turn ignition switch OFF and then disconnect negative battery cable.



- Do not disassemble ECM.
- If battery cable is disconnected, the memory will return to the initial ECM values. The ECM will now start to self-control at its initial values. Engine operation can vary slightly in this case. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.
 - Diagnostic trouble codes
 - 1st trip diagnostic trouble codes



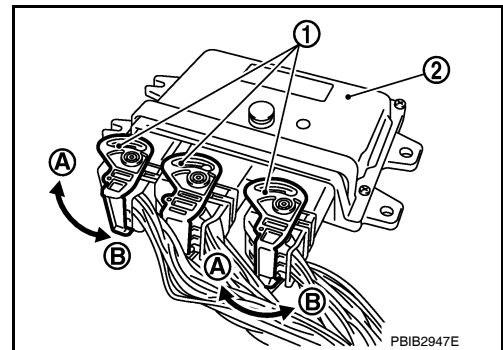
PRECAUTIONS

[MR18DE]

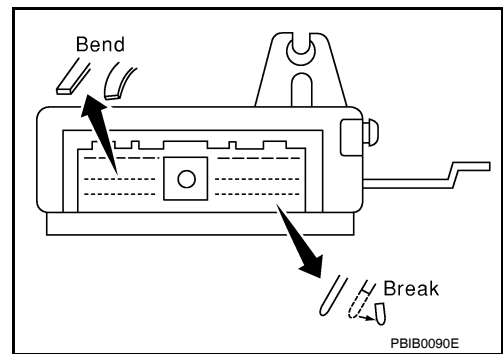
< SERVICE INFORMATION >

- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

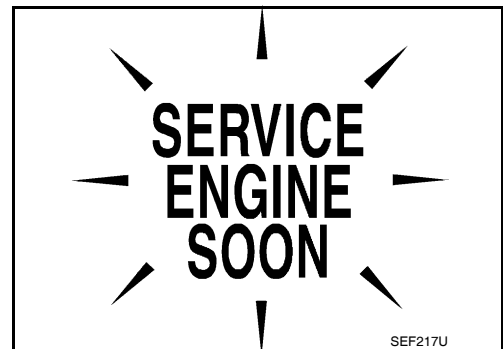
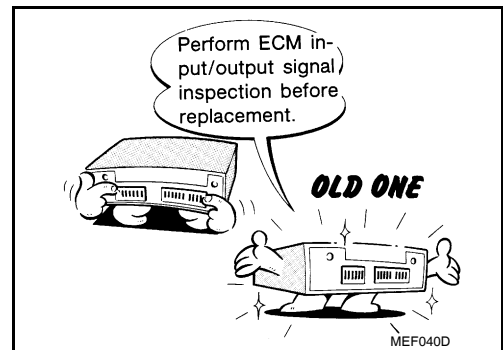
- When connecting ECM harness connector, fasten (B) it securely with a lever (1) as far as it will go as shown in the figure.
- ECM (2)
- Loosen (A)



- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).
Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors.
A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harness dry.
- Before replacing ECM, perform "ECM Terminals and Reference Value" inspection and make sure ECM functions properly. Refer to [EC-605, "ECM Terminal and Reference Value"](#).
- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).



- After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Overall Function Check.
The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Overall Function Check should be a good result if the repair is completed.

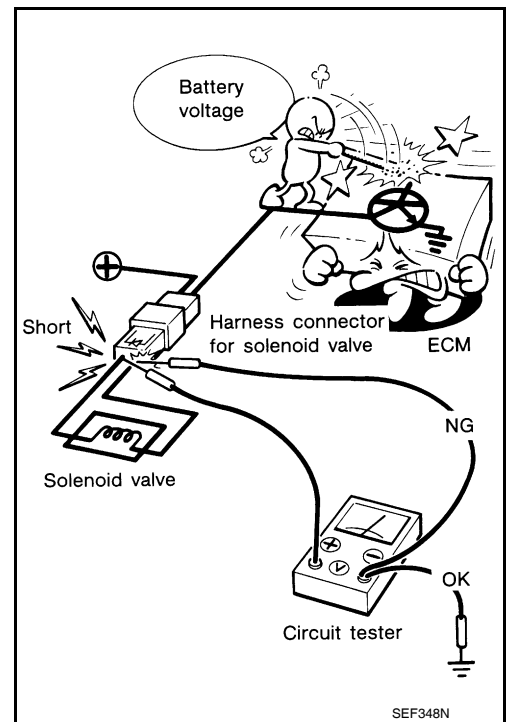


PRECAUTIONS

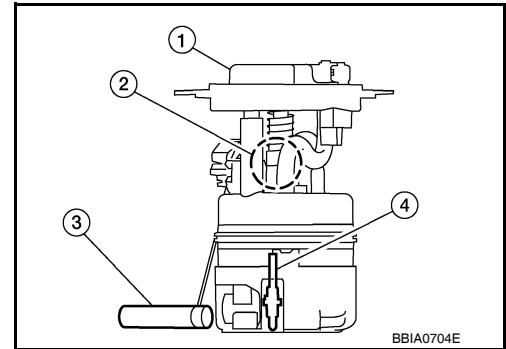
[MR18DE]

< SERVICE INFORMATION >

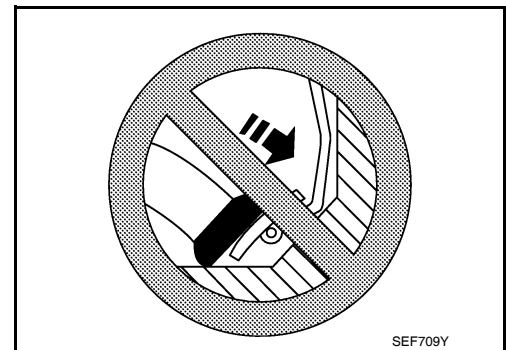
- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.



- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.
- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel level sensor (3)
- Fuel tank temperature sensor (4)



- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.

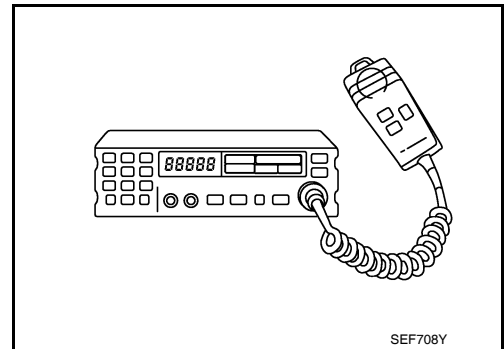


PRECAUTIONS

[MR18DE]

< SERVICE INFORMATION >

- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.
- Keep the antenna as far as possible from the electronic control units.
- Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.
Do not let them run parallel for a long distance.
- Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
- Be sure to ground the radio to vehicle body.



A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

PREPARATION

< SERVICE INFORMATION >

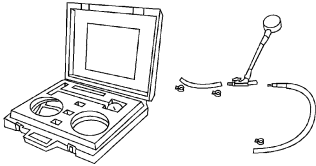
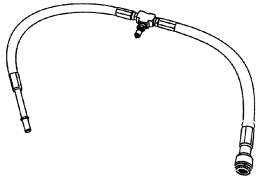
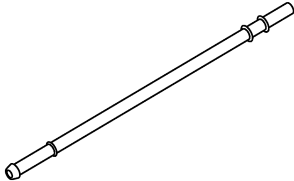
[MR18DE]

PREPARATION

Special Service Tool

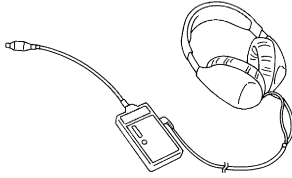
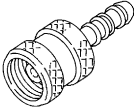
INFOID:000000005532378

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
(J-44321) Fuel pressure gauge Kit  LEC642	Checking fuel pressure
(J-44321-6) Fuel pressure adapter  LBIA0376E	Connecting fuel pressure gauge to quick connector type fuel lines.
KV10118400 Fuel tube adapter  PBIB3043E	Measuring fuel pressure

Commercial Service Tool

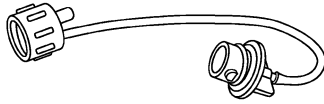
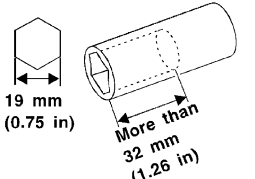
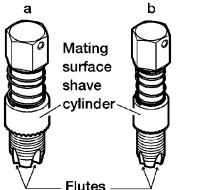

INFOID:000000005532379

Tool number (Kent-Moore No.) Tool name	Description
Leak detector i.e.: (J-41416)  S-NT703	Locating the EVAP leak
EVAP service port adapter i.e.: (J-41413-OBD)  S-NT704	Applying positive pressure through EVAP service port

PREPARATION

< SERVICE INFORMATION >

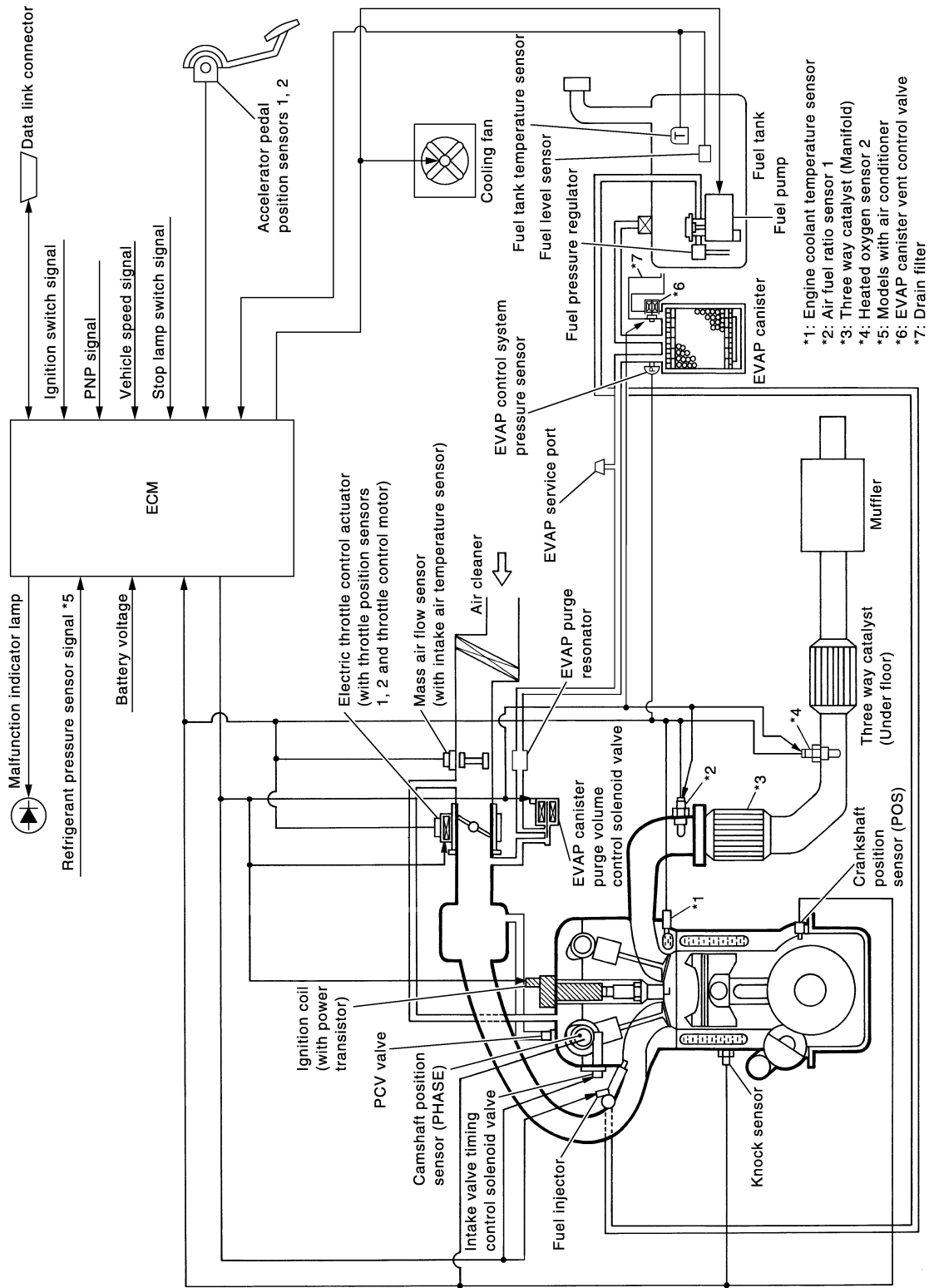
[MR18DE]

Tool number (Kent-Moore No.) Tool name	Description	A
Fuel filler cap adapter i.e.: (MLR-8382) <div style="text-align: center;">  <p>S-NT815</p> </div>	Checking fuel tank vacuum relief valve opening pressure	EC C
Socket wrench <div style="text-align: center;">  <p>19 mm (0.75 in) More than 32 mm (1.26 in) S-NT705</p> </div>	Removing and installing engine coolant temperature sensor	D E F
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12) <div style="text-align: center;">  <p>a b Mating surface shave cylinder Flutes AEM488</p> </div>	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Titanium Oxygen Sensor	G H
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907) <div style="text-align: center;">  <p>S-NT779</p> </div>	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.	I J K

ENGINE CONTROL SYSTEM

Schematic

INFOID:000000005532380



JPBIA3134GB

Multiport Fuel Injection (MFI) System

INFOID:000000005532381

INPUT/OUTPUT SIGNAL CHART

ENGINE CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*3 Piston position	Fuel injection & mixture ratio control	Fuel injector
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) signal	Gear position		
Battery	Battery voltage*3		
Knock sensor	Engine knocking condition		
EPS control unit	Power steering operation*2		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
Air conditioner switch	Air conditioner operation*2		
ABS actuator and electric unit (control unit)	Vehicle speed*2		
Combination meter			

*1: This sensor is not used to control the engine system under normal conditions.

*2: This signal is sent to the ECM through CAN communication line.

*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from the crankshaft position sensor (POS), camshaft position sensor (PHASE) and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

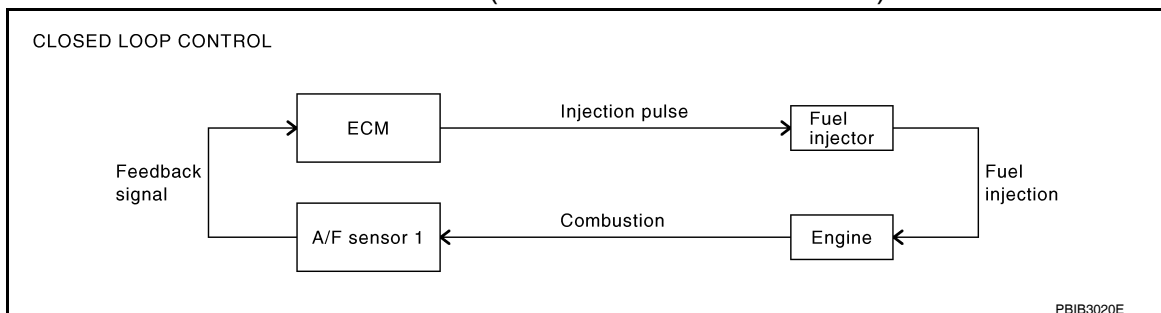
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (A/T and CVT models)
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



< SERVICE INFORMATION >

The mixture ratio feedback system provides the best air/fuel mixture ratio for drivability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses air fuel ratio (A/F) sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about air fuel ratio (A/F) sensor 1, refer to [EC-704](#). This maintains the mixture ratio within the range of stoichiometric (ideal air/fuel mixture).

This stage is referred to as the closed loop control condition.

Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of air fuel ratio (A/F) sensor 1 shift, the air/fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

Open Loop Control

The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of air fuel ratio (A/F) sensor 1 or its circuit
- Insufficient activation of air fuel ratio (A/F) sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (A/T and CVT models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from air fuel ratio (A/F) sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.

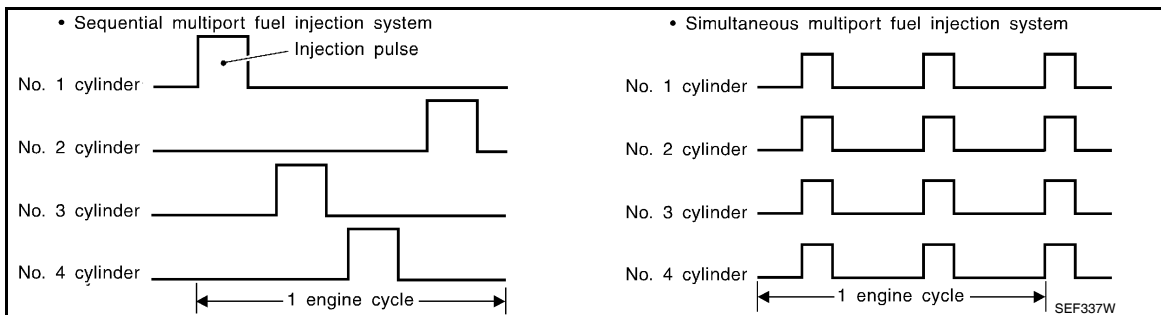
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.

"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from air fuel ratio (A/F) sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



Two types of systems are used.

Sequential Multipoint Fuel Injection System

Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.

Simultaneous Multipoint Fuel Injection System

Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.

The four fuel injectors will then receive the signals two times for each engine cycle.

ENGINE CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

Electronic Ignition (EI) System

INFOID:000000005532382

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2	Ignition timing control	Power transistor
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*2		
Knock sensor	Engine knocking		
Park/neutral position (PNP) signal	Gear position		
ABS actuator and electric unit (control unit)	Vehicle speed*1		
Combination meter			

*1: This signal is sent to the ECM through CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

Firing order: 1 - 3 - 4 - 2

The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.

The ECM receives information such as the injection pulse width and camshaft position sensor (PHASE) signal. Computing this information, ignition signals are transmitted to the power transistor.

During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Fuel Cut Control (at No Load and High Engine Speed)

INFOID:000000005532383

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Park/neutral position (PNP) signal	Neutral position	Fuel cut control	Fuel injector
Accelerator pedal position sensor	Accelerator pedal position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
ABS actuator and electric unit (control unit)	Vehicle speed*		
Combination meter			

ENGINE CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

*: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

If the engine speed is above 2,400 rpm under no load [for example, the shift lever position is P or N (A/T, CVT), Neutral (M/T) and engine speed is over 2,400 rpm] fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under [EC-516, "Multiport Fuel Injection \(MFI\) System"](#).

AIR CONDITIONING CUT CONTROL

< SERVICE INFORMATION >

[MR18DE]

AIR CONDITIONING CUT CONTROL

Input/Output Signal Chart

INFOID:000000005532384

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner ON signal* ¹	Air conditioner cut control	Air conditioner relay
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed* ²		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage* ²		
Refrigerant pressure sensor	Refrigerant pressure		
EPS control unit	Power steering operation* ¹		
ABS actuator and electric unit (control unit)	Vehicle speed* ¹		
Combination meter			

*1: This signal is sent to the ECM through CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

System Description

INFOID:000000005532385

This system improves engine operation when the air conditioner is used. Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

< SERVICE INFORMATION >

[MR18DE]

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Description

INFOID:000000005532386

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Electric throttle control actuator
Stop lamp switch	Brake pedal operation		
ASCD clutch switch (M/T models)	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/neutral position (PNP) signal	Gear position		
ABS actuator and electric unit (control unit)	Vehicle speed*		
Combination meter			
TCM	Powertrain revolution*		

*: This signal is sent to the ECM through CAN communication line.

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.

Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH).

ECM controls throttle angle of electric throttle control actuator to regulate engine speed.

Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.

NOTE:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (The CRUISE indicator in combination meter illuminates.)

When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH), press SET/COAST switch. (Then SET indicator in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is depressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.

And then ASCD will keep the new set speed.

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is pressed
- More than two switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to the neutral position (M/T models)
- Selector lever is changed to N, P, R position (A/T and CVT models)
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.

When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ACCELERATE switch.

- Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

[MR18DE]

< SERVICE INFORMATION >

When the SET/COAST switch is depressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

A

RESUME OPERATION

When the RESUME/ACCELERATE switch is depressed after cancel operation other than depressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

EC

- Brake pedal is released.
- Clutch pedal is released (M/T models)
- Selector lever is in other than P and N positions (A/T and CVT models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (89 MPH)

C

Component Description

INFOID:000000005532387

D

ASCD STEERING SWITCH

Refer to [EC-925](#).

E

ASCD BRAKE SWITCH

Refer to [EC-931](#) and [EC-996](#).

F

ASCD CLUTCH SWITCH

Refer to [EC-931](#) and [EC-996](#).

STOP LAMP SWITCH

Refer to [EC-931](#), [EC-944](#) and [EC-996](#).

G

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EC-948](#), [EC-952](#), [EC-958](#) and [EC-963](#).

H

ASCD INDICATOR

Refer to [EC-1004](#).

I

J

K

L

M

N

O

P

CAN COMMUNICATION

System Description

INFOID:000000005532388

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

Refer to [LAN-27, "CAN Communication Signal Chart"](#), about CAN communication for detail.

EVAPORATIVE EMISSION SYSTEM

< SERVICE INFORMATION >

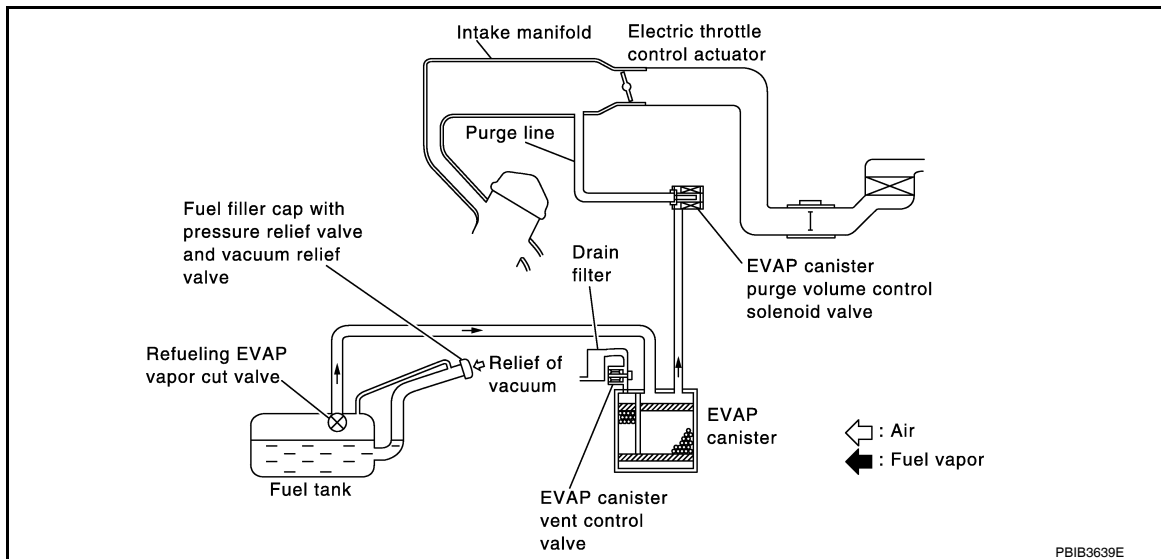
[MR18DE]

EVAPORATIVE EMISSION SYSTEM

Description

INFOID:000000005532389

SYSTEM DESCRIPTION



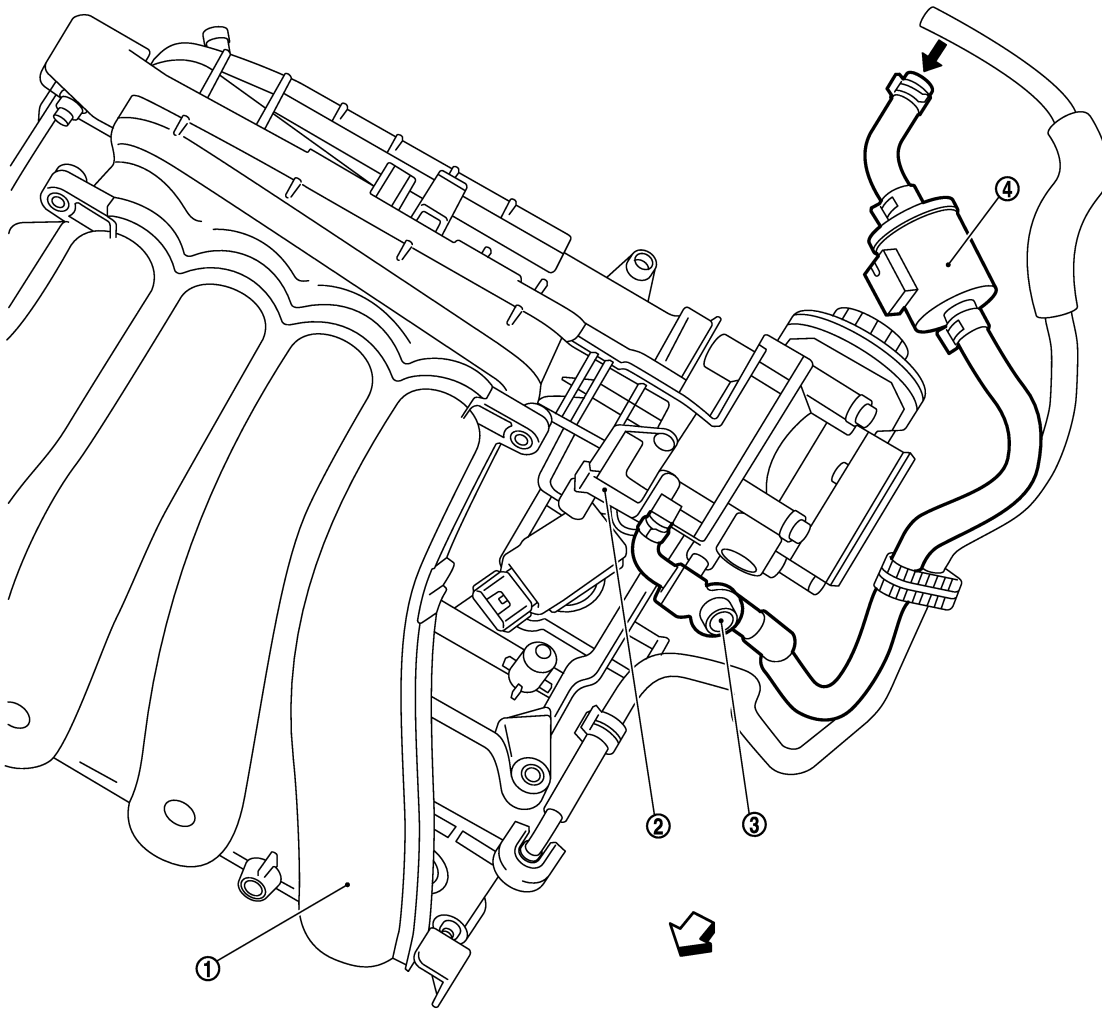
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister. The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank. The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases. EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating.

EVAPORATIVE EMISSION LINE DRAWING

EVAPORATIVE EMISSION SYSTEM

< SERVICE INFORMATION >

[MR18DE]



PBIB3330E

↔ Vehicle front

← From next figure

1. Intake manifold collector

2. EVAP canister purge volume control solenoid valve

3. EVAP service port

4. EVAP purge resonator

NOTE: Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

A

EC

C

D

E

F

G

H

I

J

K

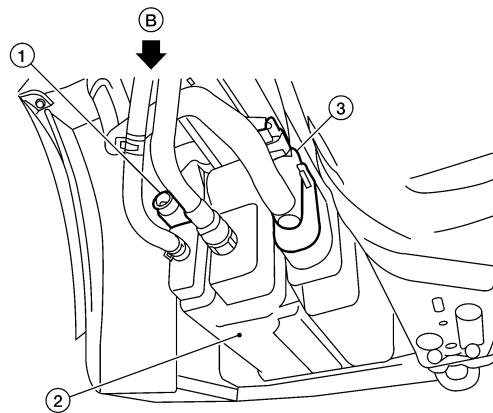
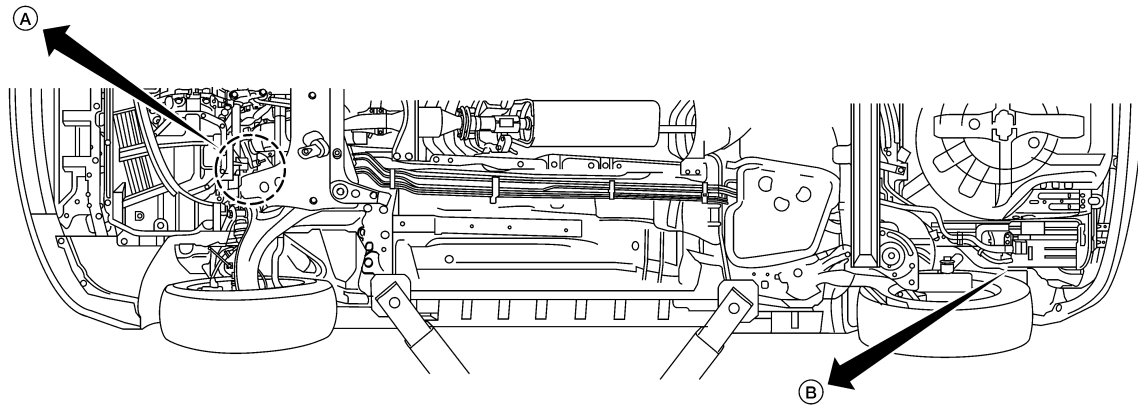
L

M

N

O

P



BBIA0692E

(A): To previous figure

1. EVAP control system pressure sensor 2. EVAP canister 3. EVAP canister vent control valve

NOTE: Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

Component Inspection

INFOID:000000005532390

EVAP CANISTER

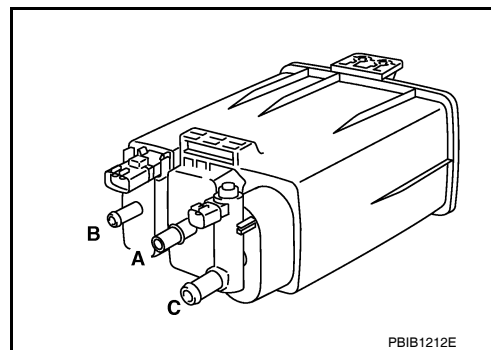
EVAPORATIVE EMISSION SYSTEM

[MR18DE]

< SERVICE INFORMATION >

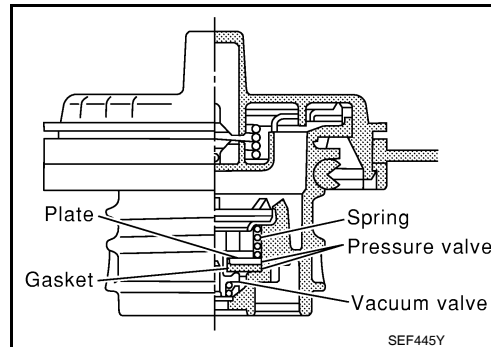
Check EVAP canister as follows:

1. Block port **(B)**.
2. Blow air into port **(A)** and confirm that it flows freely out of port **(C)**.
3. Release blocked port **(B)**.
4. Apply vacuum pressure to port **(B)** and confirm that vacuum pressure exists at the ports **(A)** and **(C)**.
5. Block port **(A)** and **(B)**.
6. Apply pressure to port **(C)** and check that there is no leakage.



FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

1. Wipe clean valve housing.



2. Check valve opening pressure and vacuum.

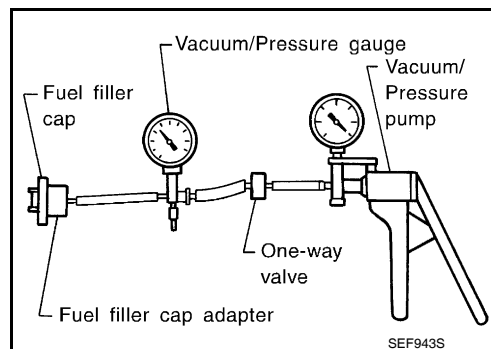
Pressure: 15.3 - 20.0 kPa
(0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

Vacuum: -6.0 to -3.4 kPa
(-0.061 to -0.035 kg/cm², -0.87 to -0.48 psi)

3. If out of specification, replace fuel filler cap as an assembly.

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.



EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-829, "Component Inspection"](#).

FUEL TANK TEMPERATURE SENSOR

Refer to [EC-773, "Component Inspection"](#).

EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-840, "Component Inspection"](#).

EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-850, "Component Inspection"](#).

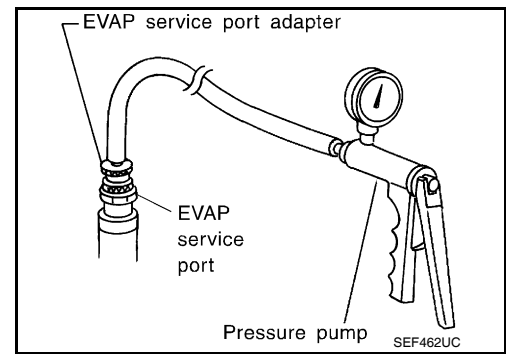
EVAP SERVICE PORT

EVAPORATIVE EMISSION SYSTEM

< SERVICE INFORMATION >

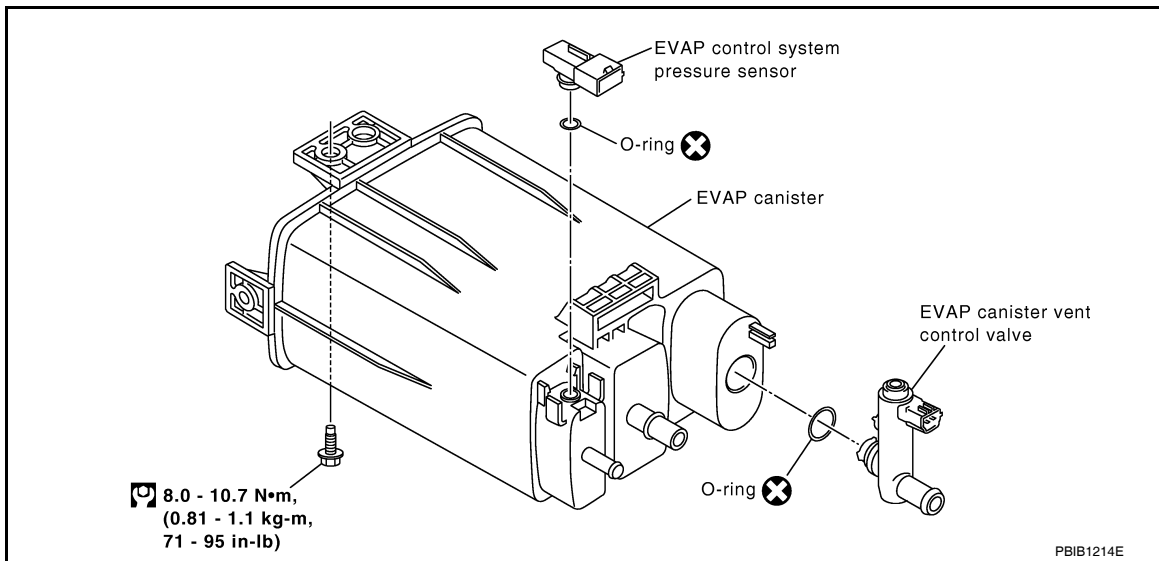
[MR18DE]

Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.



Exploded View

INFOID:000000005962108



Removal and Installation

INFOID:000000005532391

EVAP CANISTER

Removal

1. Remove EVAP canister protector.
2. Disconnect the EVAP control pressure sensor connector.
3. Remove the EVAP control pressure sensor and O-ring, if necessary.
4. Disconnect EVAP canister purge hose.
5. Remove the EVAP canister retaining bolt.
6. Disconnect fuel tank EVAP breather hose.
7. Disconnect EVAP vent control valve connector.
8. Disconnect the EVAP vent control valve hose.
9. Remove the EVAP canister.
10. Remove the EVAP vent control valve and O-ring, if necessary.

Installation

Installation is in the reverse order of removal.

CAUTION:

Always replace O-rings with a new one.

EVAP CANISTER CONTROL PRESSURE SENSOR

Removal

1. Remove EVAP canister protector.

EVAPORATIVE EMISSION SYSTEM

[MR18DE]

< SERVICE INFORMATION >

2. Disconnect the EVAP control pressure sensor connector.
3. Remove the EVAP canister control pressure sensor and O-ring.

Installation

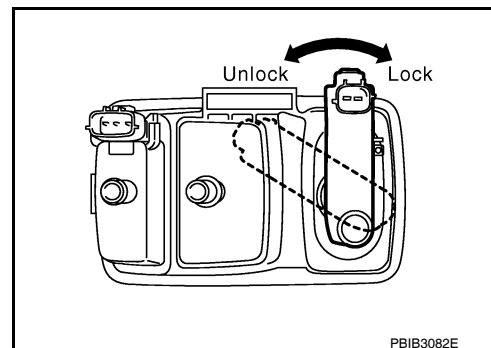
Installation is in the reverse order of removal.

CAUTION:

Always replace O-ring with a new one.

EVAP CANISTER VENT CONTROL VALVE

1. Remove EVAP canister protector.
2. Disconnect EVAP vent control valve connector.
3. Disconnect the EVAP vent control valve hose.
4. Turn EVAP canister vent control valve counterclockwise.
5. Remove the EVAP canister vent control valve.



Installation

Installation is in the reverse order of removal.

CAUTION:

Always replace O-ring with a new one.

How to Detect Fuel Vapor Leakage

INFOID:000000005532392

CAUTION:

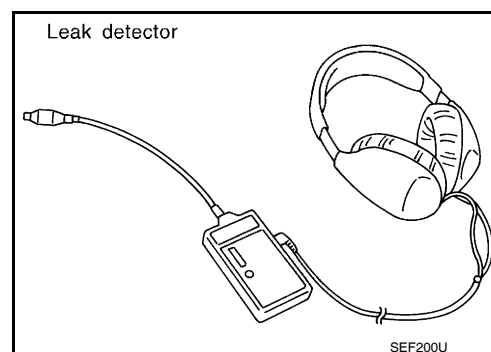
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system.

NOTE:

- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

WITH CONSULT-III

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump and hose to the EVAP service port adapter.
3. Turn ignition switch ON.
4. Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-III.
5. Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
6. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7. Remove EVAP service port adapter and hose with pressure pump.
8. Locate the leak using a leak detector. Refer to [EC-525](#). "[Description](#)".



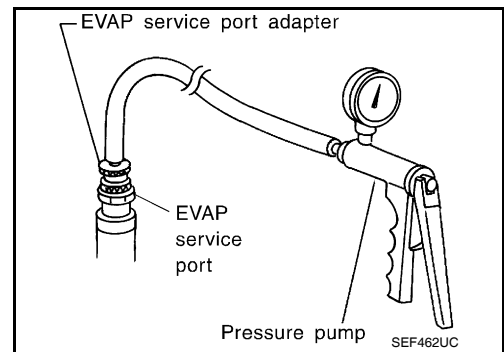
WITHOUT CONSULT-III

EVAPORATIVE EMISSION SYSTEM

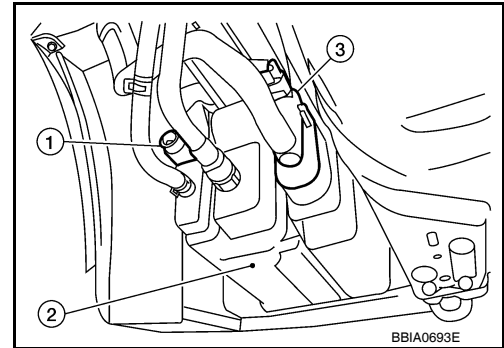
[MR18DE]

< SERVICE INFORMATION >

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump with pressure gauge to the EVAP service port adapter.



3. Apply battery voltage to the terminal of EVAP canister vent control valve (3) to make a closed EVAP system.
 - EVAP control system pressure sensor (1)
 - EVAP canister (2)



4. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm², 0.2 to 0.4 psi).
5. Remove EVAP service port adapter and hose with pressure pump.
6. Locate the leak using a leak detector. Refer to [EC-525. "Description"](#).

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

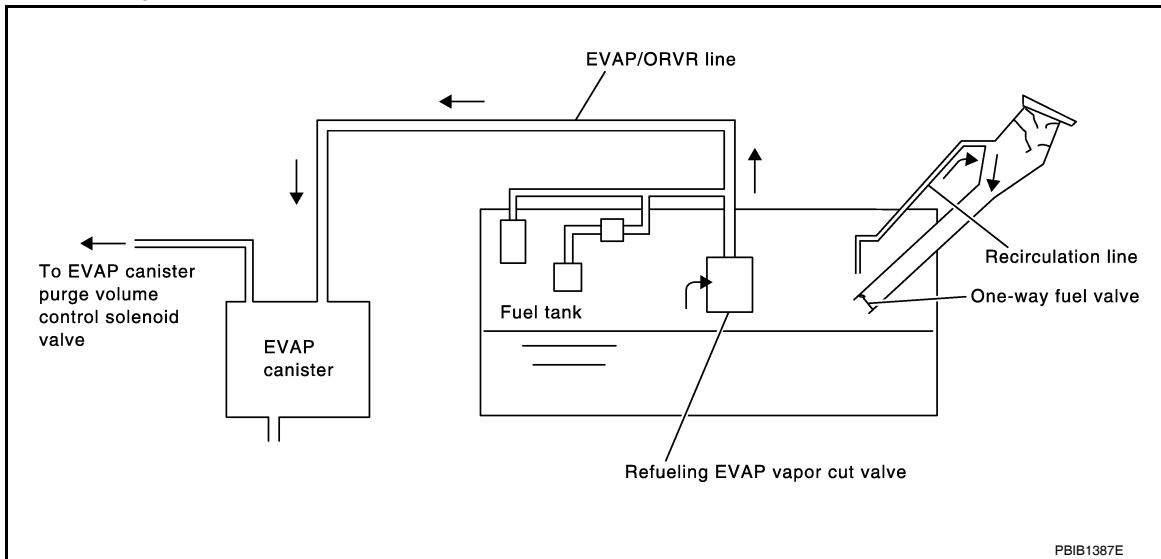
< SERVICE INFORMATION >

[MR18DE]

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

System Description

INFOID:000000005532393



PBIB1387E

From the beginning of refueling, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve and EVAP/ORVR line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

WARNING:

When conducting inspections below, be sure to observe the following:

- Put a "CAUTION: FLAMMABLE" sign in workshop.
- Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Be sure to furnish the workshop with a CO₂ fire extinguisher.

CAUTION:

- Before removing fuel line parts, carry out the following procedures:
 - Put drained fuel in an explosion-proof container and put lid on securely.
 - Release fuel pressure from fuel line. Refer to [EC-582, "Fuel Pressure Check"](#).
 - Disconnect negative battery cable.
- Always replace O-ring when the fuel gauge retainer is removed.
- Do not kink or twist hose and tube when they are installed.
- Do not tighten hose and clamps excessively to avoid damaging hoses.
- After installation, run engine and check for fuel leaks at connection.
- Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

Diagnosis Procedure

INFOID:000000005532394

SYMPTOM: FUEL ODOR FROM EVAP CANISTER IS STRONG.

1. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

- OK >> GO TO 2.
- NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

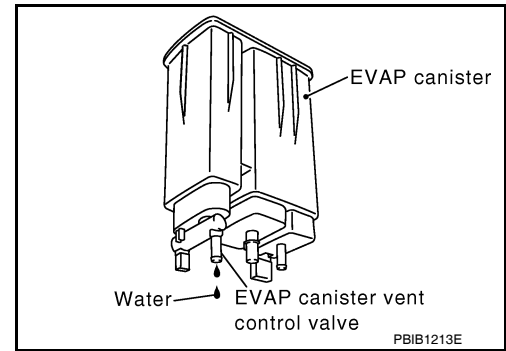
[MR18DE]

< SERVICE INFORMATION >

Does water drain from the EVAP canister?

Yes or No

- Yes >> GO TO 3.
- No >> GO TO 6.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. CHECK DRAIN FILTER

Refer to [EC-535. "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.
- NG >> Replace drain filter.

5. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

6. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to [EC-535. "Component Inspection"](#).

OK or NG

- OK >> **INSPECTION END**
- NG >> Replace refueling EVAP vapor cut valve with fuel tank.

SYMPTOM: CANNOT REFUEL/FUEL ODOR FROM THE FUEL FILLER OPENING IS STRONG WHILE REFUELING.

1. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

- OK >> GO TO 2.
- NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

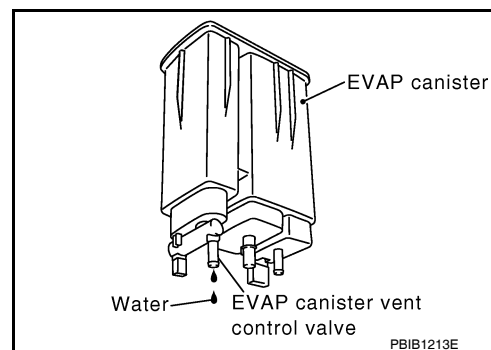
[MR18DE]

< SERVICE INFORMATION >

Does water drain from the EVAP canister?

Yes or No

- Yes >> GO TO 3.
- No >> GO TO 5.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. CHECK DRAIN FILTER

Refer to [EC-535, "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.
- NG >> Replace drain filter.

5. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

6. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling EVAP vapor cut valve for clogging, kink, looseness and improper connection.

OK or NG

- OK >> GO TO 7.
- NG >> Repair or replace hoses and tubes.

7. CHECK FILLER NECK TUBE

Check recirculation line for clogging, dents and cracks.

OK or NG

- OK >> GO TO 8.
- NG >> Replace filler neck tube.

8. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to [EC-535, "Component Inspection"](#).

OK or NG

- OK >> GO TO 9.
- NG >> Replace refueling EVAP vapor cut valve with fuel tank.

9. CHECK FUEL FILLER TUBE

Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.

OK or NG

- OK >> GO TO 10.
- NG >> Replace fuel filler tube.

10. CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

OK or NG

- OK >> GO TO 11.

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

[MR18DE]

< SERVICE INFORMATION >

NG >> Repair or replace one-way fuel valve with fuel tank.

11. CHECK ONE-WAY FUEL VALVE-II

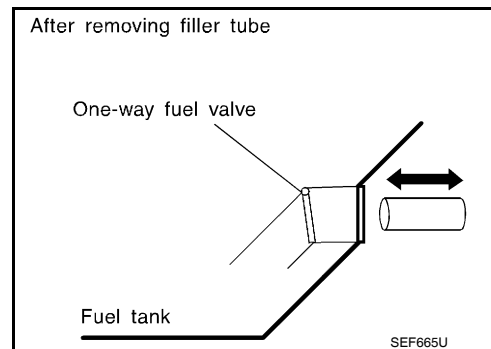
1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as follows.
When a stick is inserted, the valve should open, when removing stick it should close.

Do not drop any material into the tank.

OK or NG

OK >> **INSPECTION END**

NG >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.



INFOID:000000005532395

Component Inspection

REFUELING EVAP VAPOR CUT VALVE

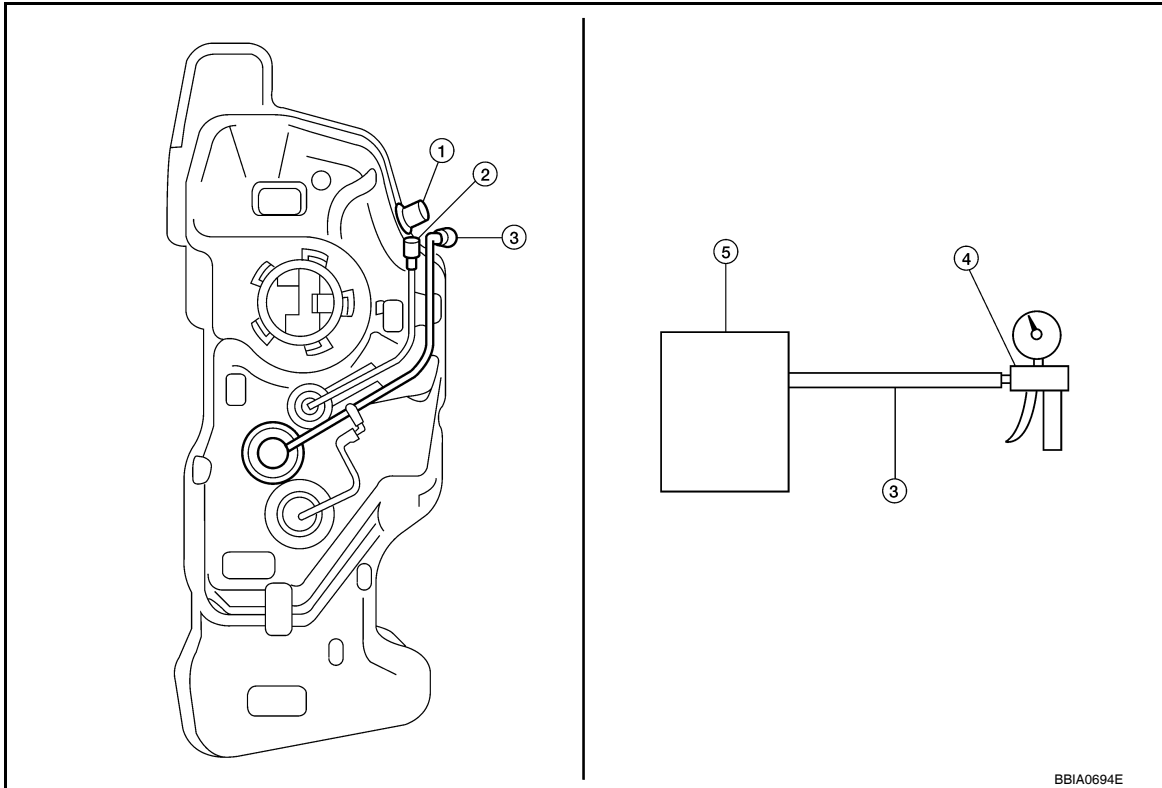
Ⓜ With CONSULT-III

1. Remove fuel tank. Refer to [FL-12. "Removal and Installation"](#).
2. Drain fuel from the tank as follows:
 - a. Remove fuel feed hose located on the fuel gauge retainer.
 - b. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
 - c. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-III.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as follows.
 - a. Connect vacuum pump to hose end.
 - b. Remove fuel gauge retainer with fuel gauge unit.
Always replace O-ring with new one.
 - c. Put fuel tank upside down.
 - d. Apply vacuum pressure to hose end [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< SERVICE INFORMATION >

[MR18DE]



- | | | |
|-------------------------------|-----------------------|-------------------|
| 1. Filler tube | 2. Recirculation line | 3. EVAP/ORVR line |
| 4. Vacuum/pressure handy pump | 5. Fuel tank | |

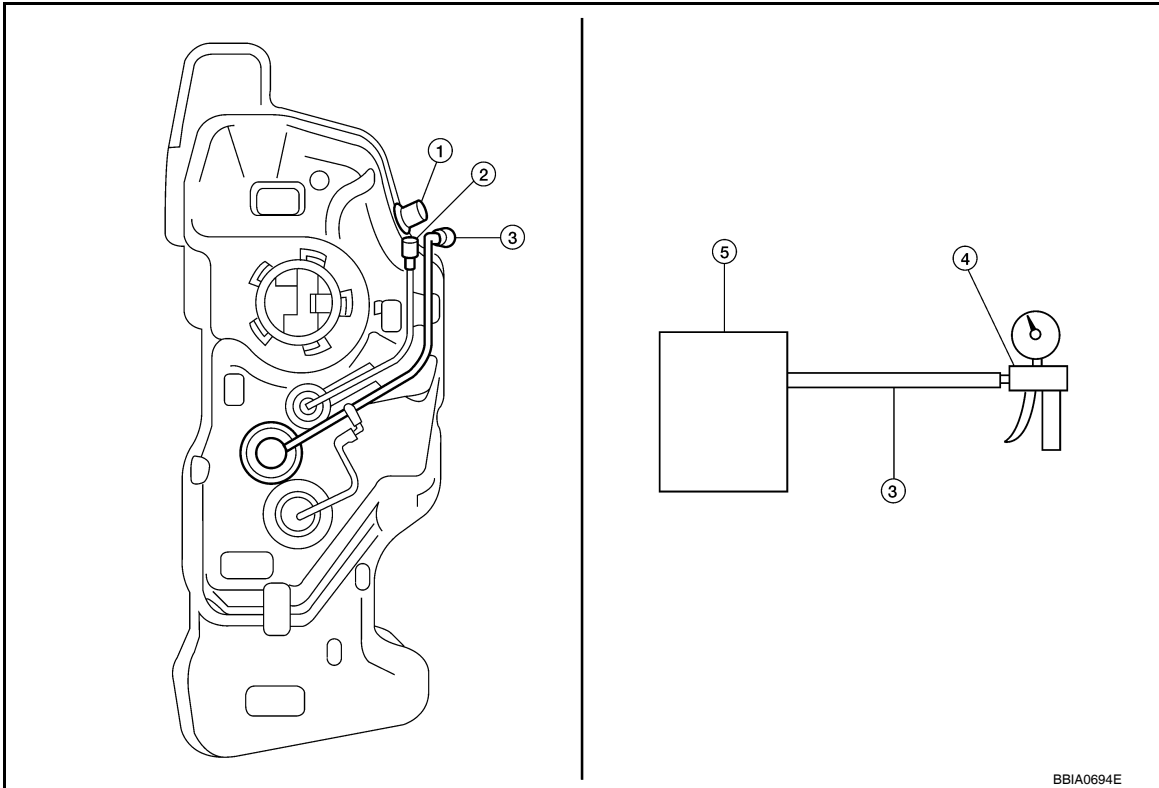
⊗ Without CONSULT-III

1. Remove fuel tank. Refer to [FL-12, "Removal and Installation"](#).
2. Drain fuel from the tank as follows:
 - a. Remove fuel gauge retainer.
 - b. Drain fuel from the tank using a handy pump into a fuel container.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as follows.
 - a. Connect vacuum pump to hose end.
 - b. Remove fuel gauge retainer with fuel gauge unit.
Always replace O-ring with new one.
 - c. Put fuel tank upside down.
 - d. Apply vacuum pressure to hose end [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< SERVICE INFORMATION >

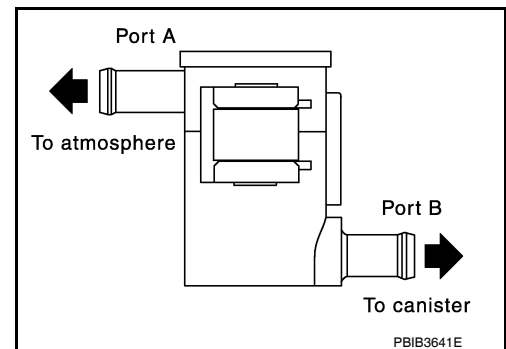
[MR18DE]



- | | | |
|-------------------------------|-----------------------|-------------------|
| 1. Filler tube | 2. Recirculation line | 3. EVAP/ORVR line |
| 4. Vacuum/pressure handy pump | 5. Fuel tank | |

DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.
7. If NG, replace drain filter.



A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

POSITIVE CRANKCASE VENTILATION

< SERVICE INFORMATION >

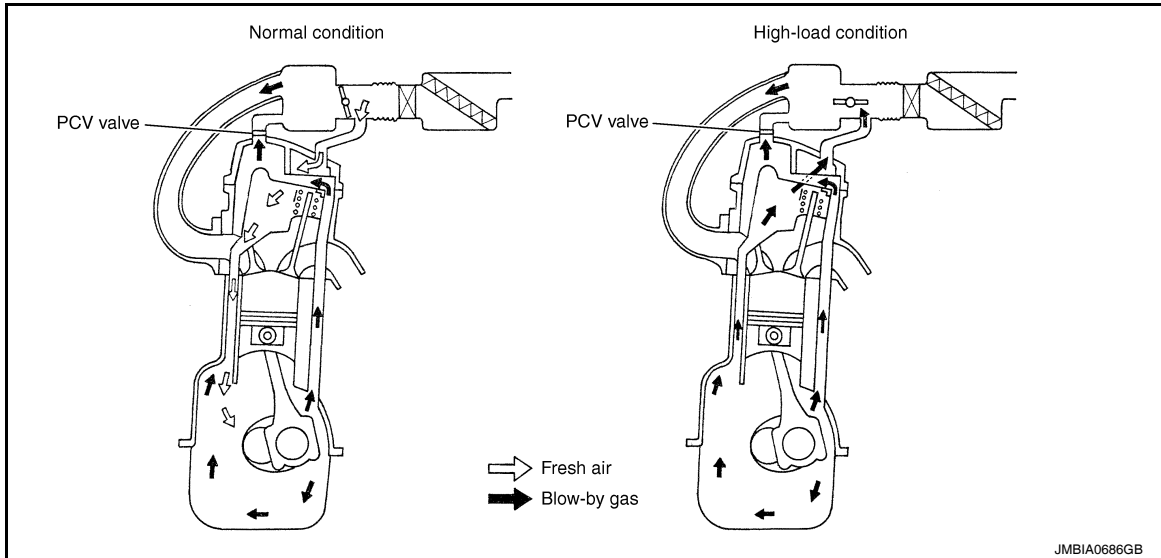
[MR18DE]

POSITIVE CRANKCASE VENTILATION

Description

INFOID:000000005532396

SYSTEM DESCRIPTION

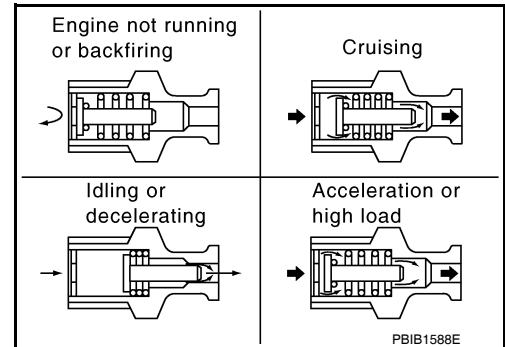


This system returns blow-by gas to the intake manifold.

The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold. During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve. Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.

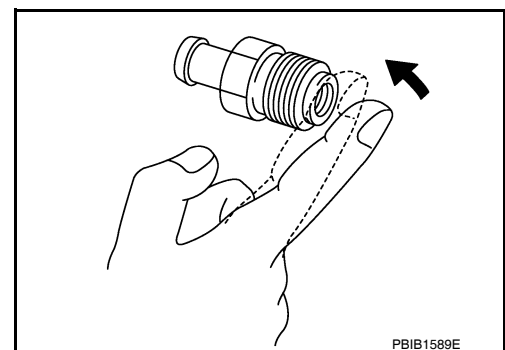


Component Inspection

INFOID:000000005532397

PCV (POSITIVE CRANKCASE VENTILATION) VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.



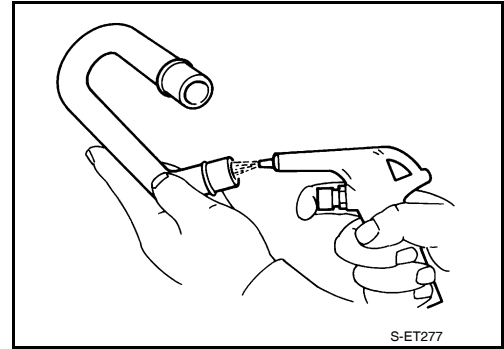
POSITIVE CRANKCASE VENTILATION

< SERVICE INFORMATION >

[MR18DE]

PCV VALVE VENTILATION HOSE

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM-NATS)

< SERVICE INFORMATION >

[MR18DE]

NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM-NATS)

Description

INFOID:000000005532398

- If the security indicator illuminates with the ignition switch ON or DTC P1610 - P1615 is displayed in "SELF DIAGNOSTIC RESULT" mode, perform the trouble diagnosis for corresponding to the detected DTC. Refer to [EC-503, "U0101-U1001"](#).
- Check that no DTC is displayed in "SELF DIAGNOSIS RESULT" mode of "BCM" before erasing the detected DTC in "ENGINE" mode with CONSULT-III.
- When replacing ECM, refer to [EC-579, "Procedure After Replacing ECM"](#).

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Introduction

INFOID:000000005532399

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	Diagnostic service
Diagnostic Trouble Code (DTC)	Service \$03 of SAE J1979/ISO 15031-5
Freeze Frame data	Service \$02 of SAE J1979/ISO 15031-5
System Readiness Test (SRT) code	Service \$01 of SAE J1979/ISO 15031-5
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Service \$07 of SAE J1979/ISO 15031-5
1st Trip Freeze Frame data	—
Test values and Test limits	Service \$06 of SAE J1979/ISO 15031-5
Calibration ID	Service \$09 of SAE J1979/ISO 15031-5
Permanent Diagnostic Trouble Code (Permanent DTC)	Service \$0A* of SAE J1979/ISO 15031-5

*: Service \$0A is not applied for regions where it is not mandated.

The above information can be checked using procedures listed in the table below.

x: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	SRT status	Test value	Permanent DTC status
CONSULT-III	x	x	x	x	x	x	—	x
GST	x	x	x	—	x	x	x	x
ECM	x	x*	—	—	—	x	—	—

*: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode.

(Refer to [EC-590, "Fail-Safe Chart"](#).)

Two Trip Detection Logic

INFOID:000000005532400

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not light up at this stage. <1st trip>

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. <2nd trip> The "trip" in the "Two Trip Detection Logic" means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

x: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	x	—	—	—	—	—	x	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	—	—	x	—	—	x	—	—
One trip detection diagnoses (Refer to EC-542, "Emission-related Diagnostic Information" .)	—	x	—	—	x	—	—	—
Except above	—	—	—	x	—	x	x	—

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[MR18DE]

< SERVICE INFORMATION >

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by MIL lighting up when there is malfunction on engine control system.
 Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.
 The fail-safe function also operates when above diagnoses except MIL circuit are detected, and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut
--	--

Emission-related Diagnostic Information

INFOID:000000005532401

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

×: Applicable —: Not applicable

Items (CONSULT-III screen terms)	DTC*1		SRT code	Trip	MIL	Permanent DTC group*4	Reference
	CONSULT-III GST*2	ECM*3					
LOST COMM (TCM)	U0101	0101*5	—	1	×	B	EC-639
LOST COMM (BCM)	U0140	0140*5	—	1	×	B	EC-641
CAN COMM CIRCUIT	U1001	1001*5	—	2	—	—	EC-643
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	P0000	0000	—	—	Flashing*6	—	EC-565
INT/V TIM CONT-B1	P0011	0011	×	2	×	B	EC-645
A/F SEN1 HTR (B1)	P0031	0031	—	2	×	B	EC-649
A/F SEN1 HTR (B1)	P0032	0032	—	2	×	B	EC-649
HO2S2 HTR (B1)	P0037	0037	—	2	×	B	EC-654
HO2S2 HTR (B1)	P0038	0038	—	2	×	B	EC-654
INT/V TIM V/CIR-B1	P0075	0075	—	2	×	B	EC-659
MAF SEN/CIRCUIT-B1	P0101	0101	—	2	×	B	EC-664
MAF SEN/CIRCUIT-B1	P0102	0102	—	1	×	B	EC-672
MAF SEN/CIRCUIT-B1	P0103	0103	—	1	×	B	EC-672
IAT SEN/CIRCUIT-B1	P0112	0112	—	2	×	B	EC-679
IAT SEN/CIRCUIT-B1	P0113	0113	—	2	×	B	EC-679
ECT SEN/CIRC	P0116	0116	—	2	×	B	EC-683
ECT SEN/CIRC	P0117	0117	—	1	×	B	EC-686
ECT SEN/CIRC	P0118	0118	—	1	×	B	EC-686
TP SEN 2/CIRC-B1	P0122	0122	—	1	×	B	EC-691
TP SEN 2/CIRC-B1	P0123	0123	—	1	×	B	EC-691
ECT SENSOR	P0125	0125	—	2	×	B	EC-696
IAT SENSOR-B1	P0127	0127	—	2	×	B	EC-699
THERMSTAT FNCTN	P0128	0128	—	2	×	B	EC-702
A/F SENSOR1 (B1)	P0130	0130	—	2	×	A	EC-704
A/F SENSOR1 (B1)	P0131	0131	—	2	×	B	EC-710
A/F SENSOR1 (B1)	P0132	0132	—	2	×	B	EC-716
HO2S2 (B1)	P0137	0137	×	2	×	A	EC-722
HO2S2 (B1)	P0138	0138	×	2	×	A	EC-731
HO2S2 (B1)	P0139	0139	×	2	×	A	EC-741
A/F SENSOR1 (B1)	P014C	014C	—	2	×	A	EC-750

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]

Items (CONSULT-III screen terms)	DTC*1		SRT code	Trip	MIL	Permanent DTC group*4	Reference	
	CONSULT-III GST*2	ECM*3						
A/F SENSOR1 (B1)	P014D	014D	—	2	×	A	EC-750	EC
A/F SENSOR1 (B1)	P015A	015A	—	2	×	A	EC-750	
A/F SENSOR1 (B1)	P015B	015B	—	2	×	A	EC-750	
FUEL SYS-LEAN-B1	P0171	0171	—	2	×	B	EC-758	C
FUEL SYS-RICH-B1	P0172	0172	—	2	×	B	EC-764	
FTT SENSOR	P0181	0181	—	2	×	B	EC-770	D
FTT SEN/CIRCUIT	P0182	0182	—	2	×	B	EC-774	
FTT SEN/CIRCUIT	P0183	0183	—	2	×	B	EC-774	
TP SEN 1/CIRC-B1	P0222	0222	—	1	×	B	EC-778	E
TP SEN 1/CIRC-B1	P0223	0223	—	1	×	B	EC-778	
MULTI CYL MISFIRE	P0300	0300	—	1 or 2	×	B	EC-783	F
CYL 1 MISFIRE	P0301	0301	—	1 or 2	×	B	EC-783	
CYL 2 MISFIRE	P0302	0302	—	1 or 2	×	B	EC-783	
CYL 3 MISFIRE	P0303	0303	—	1 or 2	×	B	EC-783	G
CYL 4 MISFIRE	P0304	0304	—	1 or 2	×	B	EC-783	
KNOCK SEN/CIRC-B1	P0327	0327	—	2	—	—	EC-789	H
KNOCK SEN/CIRC-B1	P0328	0328	—	2	—	—	EC-789	
CKP SEN/CIRCUIT	P0335	0335	—	2	×	B	EC-793	
CMP SEN/CIRC-B1	P0340	0340	—	2	×	B	EC-799	I
TW CATALYST SYS-B1	P0420	0420	×	2	×	A	EC-805	
EVAP PURG FLOW/MON	P0441	0441	×	2	×	A	EC-810	J
EVAP SMALL LEAK	P0442	0442	×	2	×	A	EC-815	
PURG VOLUME CONT/V	P0443	0443	—	2	×	A	EC-822	K
PURG VOLUME CONT/V	P0444	0444	—	2	×	B	EC-830	
PURG VOLUME CONT/V	P0445	0445	—	2	×	B	EC-830	
VENT CONTROL VALVE	P0447	0447	—	2	×	B	EC-836	L
VENT CONTROL VALVE	P0448	0448	—	2	×	B	EC-842	
EVAP SYS PRES SEN	P0451	0451	—	2	×	A	EC-848	M
EVAP SYS PRES SEN	P0452	0452	—	2	×	B	EC-851	
EVAP SYS PRES SEN	P0453	0453	—	2	×	B	EC-858	
EVAP GROSS LEAK	P0455	0455	—	2	×	A	EC-866	N
EVAP VERY SML LEAK	P0456	0456	×*7	2	×	A	EC-873	
FUEL LEV SEN SLOSH	P0460	0460	—	2	×	A	EC-881	O
FUEL LEVEL SENSOR	P0461	0461	—	2	×	B	EC-883	
FUEL LEVL SEN/CIRC	P0462	0462	—	2	×	B	EC-885	
FUEL LEVL SEN/CIRC	P0463	0463	—	2	×	B	EC-885	P
VEH SPEED SEN/CIRC*8	P0500	0500	—	2	×	B	EC-887	
ISC SYSTEM	P0506	0506	—	2	×	B	EC-889	
ISC SYSTEM	P0507	0507	—	2	×	B	EC-891	
ECM	P0605	0605	—	1 or 2	— or ×	B	EC-893	
ECM	P0607	0607	—	1 (CVT) 1 (A/T) 2 (M/T)	× (CVT) × (A/T) — (M/T)	B	EC-893	

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]

Items (CONSULT-III screen terms)	DTC*1		SRT code	Trip	MIL	Permanent DTC group*4	Reference
	CONSULT-III GST*2	ECM*3					
SENSOR POWER/CIRC	P0643	0643	—	1	×	B	EC-896
T/M RANGE SENSOR A	P0705	0705	—	2	×	B	AT-90 (A/T) CVT-62 (CVT)
FLUID TEMP SENSOR A*9	P0710	0710	—	2 (A/T) 1 (CVT)	×	B	AT-95 (A/T) CVT-67 (CVT)
INPUT SPEED SENSOR A	P0715	0715	—	2	×	B	CVT-72
OUTPUT SPEED SENSOR*8	P0720	0720	—	2	×	B	AT-100 (A/T) CVT-76 (CVT)
ENGINE SPEED	P0725	0725	—	2	×	B	AT-105
1GR INCORRECT RATIO*9	P0731	0731	—	2	×	B	AT-109
2GR INCORRECT RATIO*9	P0732	0732	—	2	×	B	AT-112
3GR INCORRECT RATIO*9	P0733	0733	—	2	×	B	AT-115
4GR INCORRECT RATIO*9	P0734	0734	—	2	×	B	AT-118
TORQUE CONVERTER	P0740	0740	—	2	×	B	AT-123 (A/T) CVT-84 (CVT)
TORQUE CONVERTER	P0744	0744	—	2	×	B	AT-128 (A/T) CVT-89 (CVT)
PC SOLENOID A	P0745	0745	—	2	×	B	AT-133 (A/T) CVT-91 (CVT)
PC SOLENOID A	P0746	0746	—	1	×	B	CVT-96
SHIFT SOLENOID A	P0750	0750	—	1	×	B	AT-138
SHIFT SOLENOID B	P0755	0755	—	1	×	B	AT-143
PC SOLENOID B	P0776	0776	—	2	×	B	CVT-98
PC SOLENOID B	P0778	0778	—	2	×	B	CVT-100
FLUID PRESS SEN/SW A	P0840	0840	—	2	×	B	CVT-105
P-N POS SW/CIRCUIT	P0850	0850	—	2	×	B	EC-901
CLOSED LOOP-B1	P1148	1148	—	1	×	A	EC-907
TCS C/U FUNCTN	P1211	1211	—	2	—	—	EC-908
TCS/CIRC	P1212	1212	—	2	—	—	EC-909
ENG OVER TEMP	P1217	1217	—	1	×	B	EC-910
CTP LEARNING-B1	P1225	1225	—	2	—	—	EC-919
CTP LEARNING-B1	P1226	1226	—	2	—	—	EC-921
COLD START CONTROL	P1421	1421	—	2	×	A	EC-923
ASCD SW	P1564	1564	—	1	—	—	EC-925
ASCD BRAKE SW	P1572	1572	—	1	—	—	EC-931
ASCD VHL SPD SEN	P1574	1574	—	1	—	—	EC-940
LOCK MODE	P1610	1610	—	2	—	—	BL-259
ID DISCORD,IMMU-ECM	P1611	1611	—	2	—	—	BL-259
CHAIN OF ECM-IMMU	P1612	1612	—	2	—	—	BL-259
CHAIN OF IMMU-KEY	P1614	1614	—	2	—	—	BL-259

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]

Items (CONSULT-III screen terms)	DTC*1		SRT code	Trip	MIL	Permanent DTC group*4	Reference
	CONSULT-III GST*2	ECM*3					
DIFFERENCE OF KEY	P1615	1615	—	2	—	—	BL-259
IN PULY SPEED	P1715	1715	—	2	—	—	EC-942 (A/T) EC-942 (CVT)
SLCT SOLENOID	P1740	1740	—	2	×	B	CVT-124
OVER CLUTCH SOLENOID	P1760	1760	—	2	×	B	AT-148
STEP MOTOR	P1777	1777	—	1	×	B	CVT-129
STEP MOTOR	P1778	1778	—	2	×	B	CVT-133
BRAKE SW/CIRCUIT	P1805	1805	—	2	—	—	EC-944
ETC MOT PWR-B1	P2100	2100	—	1	×	B	EC-948
ETC FNCTN/CIRC-B1	P2101	2101	—	1	×	B	EC-952
ETC MOT PWR	P2103	2103	—	1	×	B	EC-948
ETC MOT-B1	P2118	2118	—	1	×	B	EC-958
ETC ACTR-B1	P2119	2119	—	1	×	B	EC-963
APP SEN 1/CIRC	P2122	2122	—	1	×	B	EC-965
APP SEN 1/CIRC	P2123	2123	—	1	×	B	EC-965
APP SEN 2/CIRC	P2127	2127	—	1	×	B	EC-970
APP SEN 2/CIRC	P2128	2128	—	1	×	B	EC-970
TP SENSOR-B1	P2135	2135	—	1	×	B	EC-977
APP SENSOR	P2138	2138	—	1	×	B	EC-982
A/F SENSOR1 (B1)	P2A00	2A00	—	2	×	A	EC-989

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012/ISO 15031-6.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: Refer to [EC-542, "Emission-related Diagnostic Information"](#), "PERMANENT DIAGNOSTIC TROUBLE CODE (PERMANENT DTC)".

*5: The troubleshooting for this DTC needs CONSULT-III.

*6: When the ECM in the mode of displaying SRT status, MIL may flash. For the details, refer to "How to Display SRT Status".

*7: SRT code will not be set if the self-diagnostic result is NG.

*8: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

*9: When erasing this DTC, always use CONSULT-III or GST.

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not recur, the 1st trip DTC will not be displayed.

If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".

For malfunctions in which 1st trip DTCs are displayed, refer to "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS". These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-III.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[MR18DE]

< SERVICE INFORMATION >

1st trip DTC is specified in Service \$07 of SAE J1979/ISO 15031-5. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a malfunction. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to [EC-585, "Trouble Diagnosis Introduction"](#). Then perform DTC Confirmation Procedure or Overall Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

 **WITH CONSULT-III**

 **WITH GST**

CONSULT-III or GST (Generic Scan Tool) Examples: P0340, P0850, P1148, etc.

These DTCs are prescribed by SAE J2012/ISO 15031-6.

(CONSULT-III also displays the malfunctioning component or system.)

 **NO TOOLS**

The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0340, 0850, 1148, etc.

These DTCs are controlled by NISSAN.

- **1st trip DTC No. is the same as DTC No.**
- **Output of a DTC indicates a malfunction. However, GST and the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-III can identify malfunction status as shown below. Therefore, using CONSULT-III (if available) is recommended.**

DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT-III.

Time data indicates how many times the vehicle was driven after the last detection of a DTC.

If the DTC is being detected currently, the time data will be [0].

If a 1st trip DTC is stored in the ECM, the time data will be [1t].

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen, not on the GST. For details, see [EC-612, "CONSULT-III Function \(ENGINE\)"](#).

Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items (Includes A/T or CVT related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS".

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Service \$01 of SAE J1979/ISO 15031-5.

As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.

If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating "INCMP", use the information in this Service Manual to set the SRT to "CMPLT".

In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate "CMPLT" for each application system. Once set as "CMPLT", the SRT status remains "CMPLT" until the self-diagnosis memory is erased.

Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate "INCMP" for these items.

NOTE:

The SRT will also indicate "INCMP" if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.

If, during the state emissions inspection, the SRT indicates "CMPLT" for all test items, the inspector will continue with the emissions test. However, if the SRT indicates "INCMP" for one or more of the SRT items the vehicle is returned to the customer untested.

NOTE:

If permanent DTC is stored or MIL illuminates during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates "CMPLT" for all test items. Therefore, it is important to check SRT ("CMPLT"), DTC (No DTCs) and permanent DTC (No permanent DTCs) before the inspection.

SRT Item

The table below shows required self-diagnostic items to set the SRT to "CMPLT".

SRT item (CONSULT-III indication)	Performance Priority*	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420
EVAP SYSTEM	2	EVAP control system purge flow monitoring	P0441
	1	EVAP control system	P0442
	2	EVAP control system	P0456
HO2S	2	Air fuel ratio (A/F) sensor 1	—
		Heated oxygen sensor 2	P0137
		Heated oxygen sensor 2	P0138
		Heated oxygen sensor 2	P0139
EGR/VVT SYSTEM	3	Intake valve timing control function	P0011

*: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT-III.

SRT Set Timing

SRT is set as "CMPLT" after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

Self-diagnosis result	Example							
	Diagnosis	Ignition cycle						
		← ON →	OFF	← ON →	OFF	← ON →	OFF	← ON →

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]

All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“CMPLT”	“CMPLT”	“CMPLT”	“CMPLT”
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“INCMP”	“INCMP”	“CMPLT”	“CMPLT”
NG exists	Case 3	P0400	OK	OK	—	—
		P0402	—	—	—	—
		P1402	NG	—	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MIL “ON”)
		SRT of EGR	“INCMP”	“INCMP”	“INCMP”	“CMPLT”

OK: Self-diagnosis is carried out and the result is OK.

NG: Self-diagnosis is carried out and the result is NG.

—: Self-diagnosis is not carried out.

When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above

When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses have at least one OK result. → Case 2 above

If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate “CMPLT”. → Case 3 above

The table above shows that the minimum number of cycles for setting SRT as “INCMP” is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

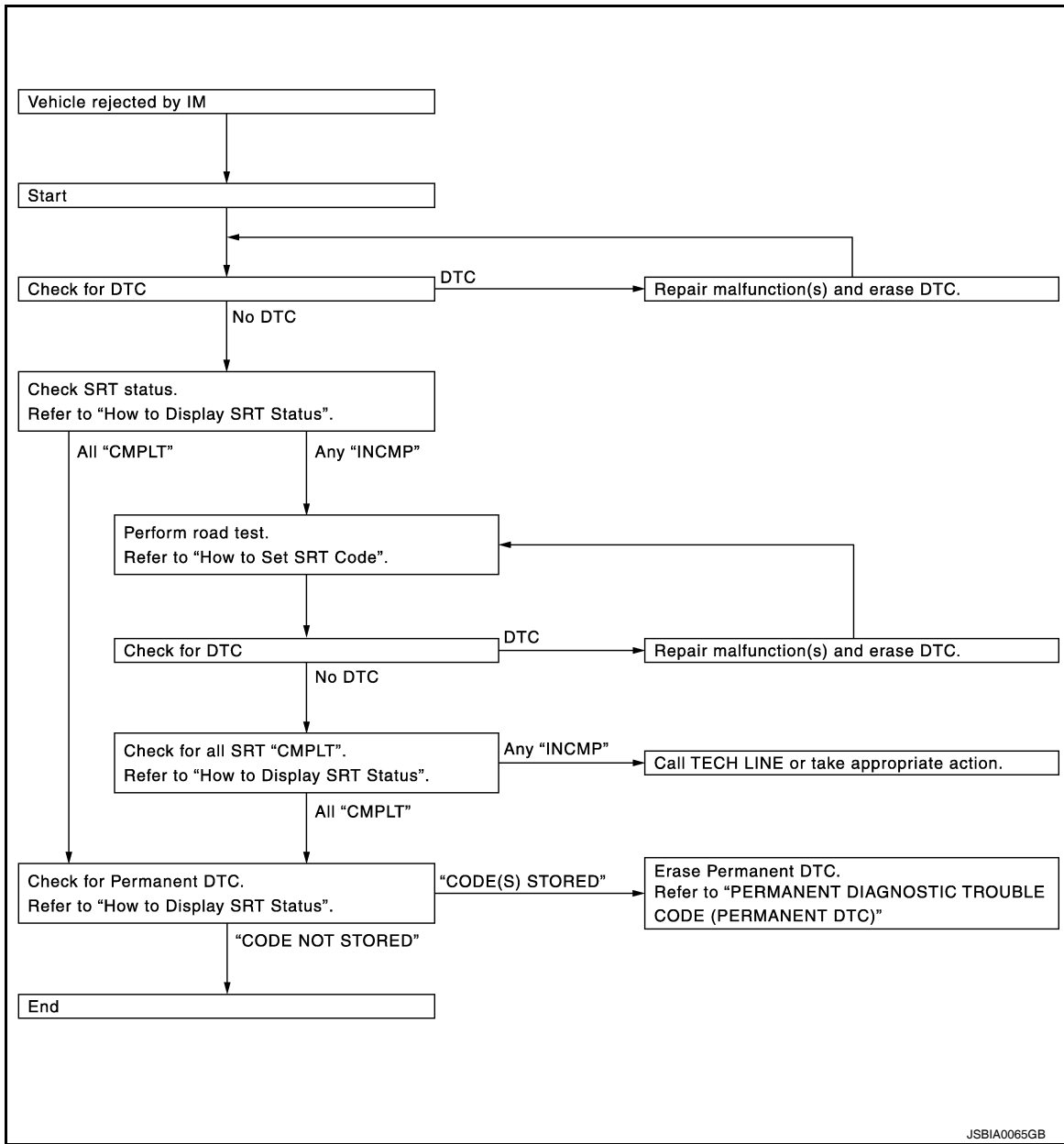
- The SRT will indicate “CMPLT” at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires “CMPLT” of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to “CMPLT” of SRT, the self-diagnosis memory must be erased from ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate “INCMP”.

NOTE:

SRT can be set as “CMPLT” together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates “CMPLT”.

SRT Service Procedure

If a vehicle has failed the state emissions inspection due to one or more SRT items indicating “INCMP”, review the flowchart diagnostic sequence on the next page.



How to Display SRT Status

WITH CONSULT-III

Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-III.

For items whose SRT codes are set, "CMPLT" is displayed on the CONSULT-III screen; for items whose SRT codes are not set, "INCMP" is displayed.

NOTE:

- Though displayed on the CONSULT-III screen, "HO2S HTR" is not SRT item.
- "SRT STATUS" provides the presence or absence of permanent DTCs stored in ECM memory.

WITH GST

Selecting Service \$01 with GST (Generic Scan Tool)

NO TOOLS

A SRT code itself cannot be displayed, however SRT status can.

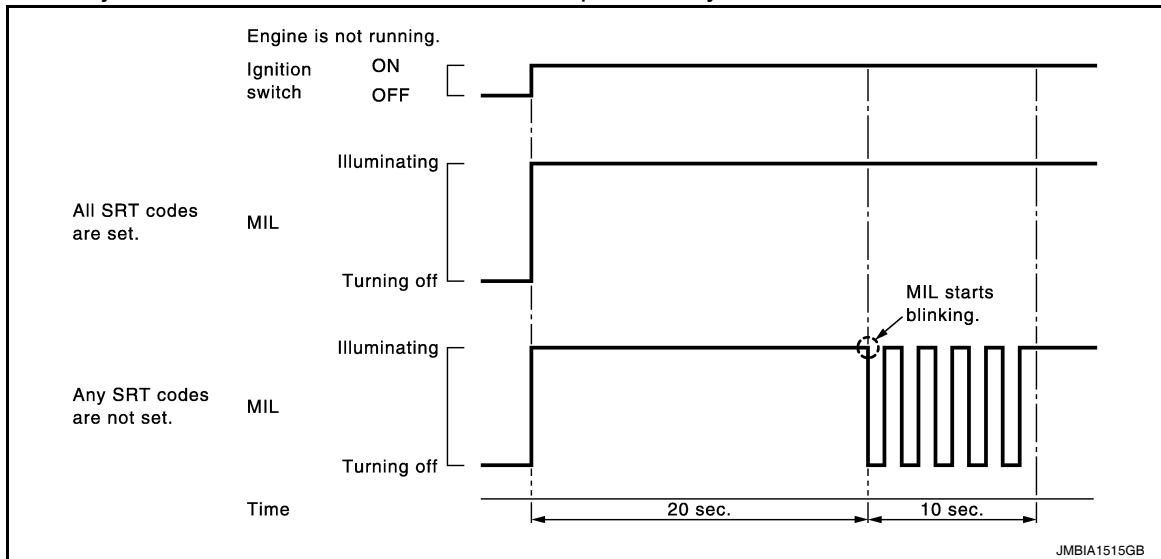
1. Turn ignition switch ON and wait 20 seconds.
2. SRT status is indicated as shown below.
 - When all SRT codes are set, MIL illuminates continuously.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[MR18DE]

< SERVICE INFORMATION >

- When any SRT codes are not set, MIL will blink periodically for 10 seconds.



How to Set SRT Code

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

📖 WITH CONSULT-III

Perform corresponding DTC Confirmation Procedure one by one based on Performance Priority in the table on "SRT Item".

🚗 WITHOUT CONSULT-III

The most efficient driving pattern in which SRT codes can be properly set is explained below. The driving pattern should be performed one or more times to set all SRT codes.

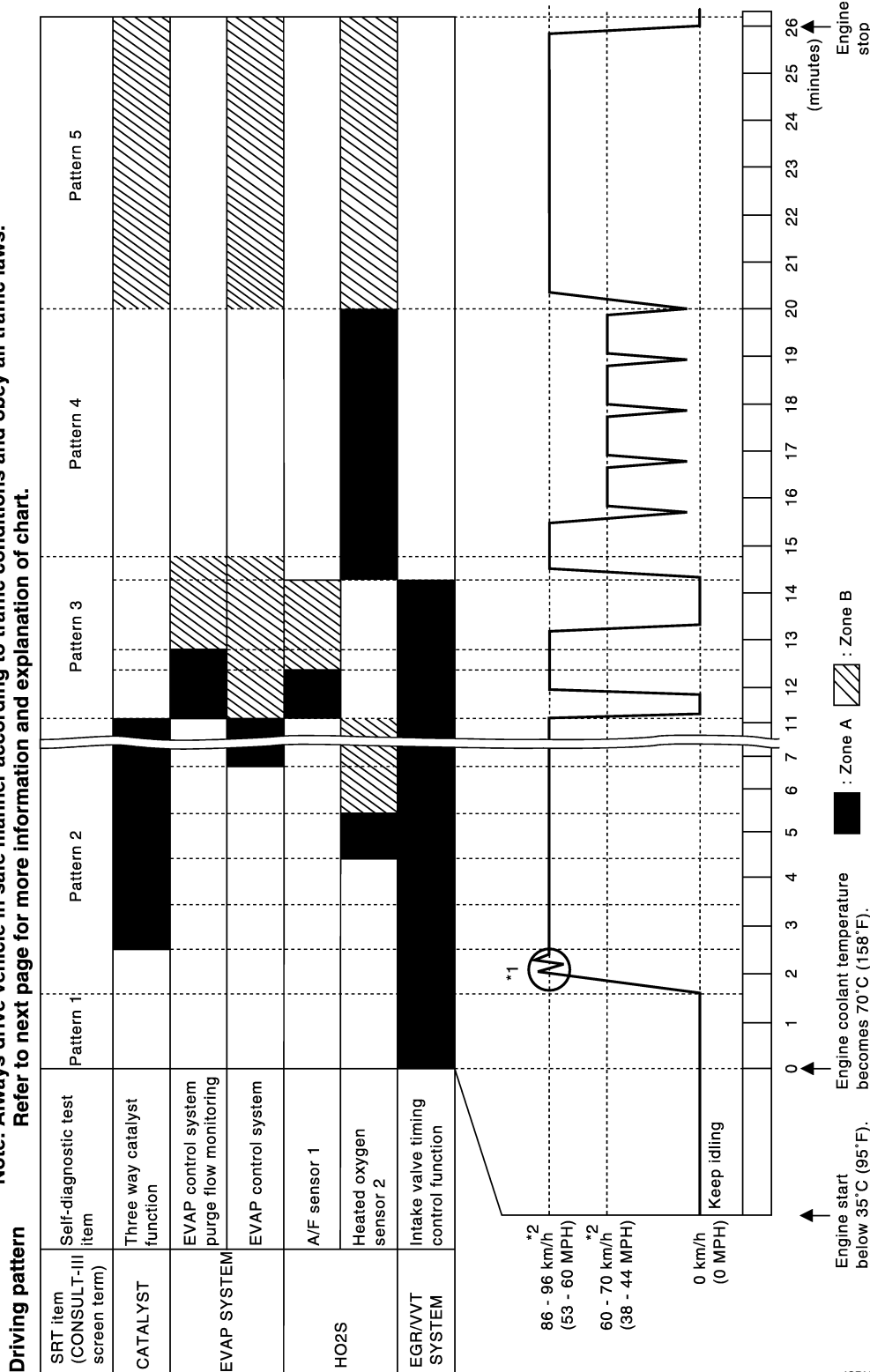
ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]

Driving Pattern

**Note: Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.
Refer to next page for more information and explanation of chart.**



JSBIA0162GB

- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
 - Zone A refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.
 - Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.
- *: Normal conditions refer to the following:

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[MR18DE]

< SERVICE INFORMATION >

- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

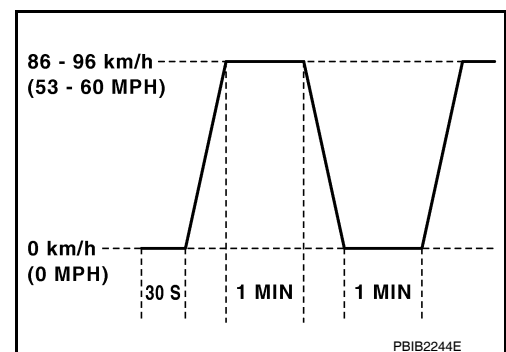
- **The engine is started at the engine coolant temperature of -10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 38 and ground is 3.0 - 4.3 V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 38 and ground is lower than 1.4 V).**
- **The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 43 and ground is less than 4.1 V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

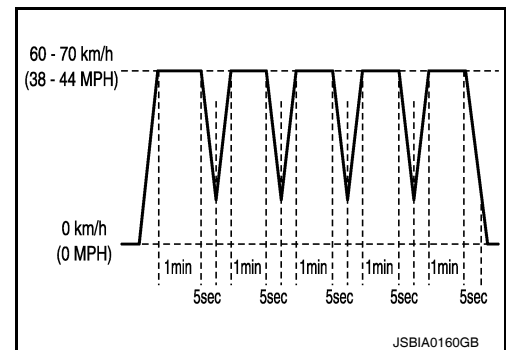
Pattern 3:

- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during decelerating vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).



Pattern 4:

- Operate vehicle, following the driving pattern shown in the figure.
- Drive the vehicle in a proper gear at 60 km/h (38 MPH) and maintain the speed.
- Release the accelerator pedal fully at least 5 seconds.
- Repeat the above two steps at least 5 times.



Pattern 5:

- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

*2: Checking the vehicle speed with GST is advised.

Suggested Transmission Gear Position for A/T and CVT Models

Set the selector lever in the D position.

Suggested upshift speeds for M/T models

Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]

	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:	For quick acceleration in low altitude areas	For high altitude areas [over 1,219m (4,000 ft)]:
Gear change	ACCEL shift point km/h (MPH)	km/h (MPH)	km/h (MPH)
1st to 2nd	13 (8)	24 (15)	24 (15)
2nd to 3rd	27 (17)	40 (25)	40 (25)
3rd to 4th	40 (25)	53 (33)	65 (40)
4th to 5th	58 (36)	71 (44)	72 (45)
5th to 6th	82 (51)	82 (51)	82 (51)

Suggested Maximum Speed in Each Gear

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate.

Do not exceed the maximum suggested speed (shown below) in any gear. For level road driving, use the highest gear suggested for that speed. Always observe posted speed limits and drive according to the road conditions to ensure safe operation. Do not over-rev the engine when shifting to a lower gear as it may cause engine damage or loss of vehicle control.

Gear	km/h (MPH)
1st	50 (30)
2nd	90 (55)
3rd	—
4th	—
5th	—
6th	—

PERMANENT DIAGNOSTIC TROUBLE CODE (PERMANENT DTC)

Permanent DTC is defined in SAE J1979/ISO 15031-5 Service \$0A.

ECM stores a DTC issuing a command of turning on MIL as a permanent DTC and keeps storing the DTC as a permanent DTC until ECM judges that there is no presence of malfunction.

Permanent DTCs cannot be erased by using the Erase function of CONSULT-III or Generic Scan Tool (GST) and by disconnecting the battery to shut off power to ECM. This prevents a vehicle from passing the state emission inspection without repairing a malfunctioning part.

When not passing the state emission inspection due to more than one permanent DTC, permanent DTCs should be erased, referring to this manual.

NOTE:

- The important items in state emission inspection are that MIL is not ON, SRT test items are set, and permanent DTCs are not included.
- Permanent DTCs do not apply for regions that permanent DTCs are not regulated by law.

Permanent DTC Item

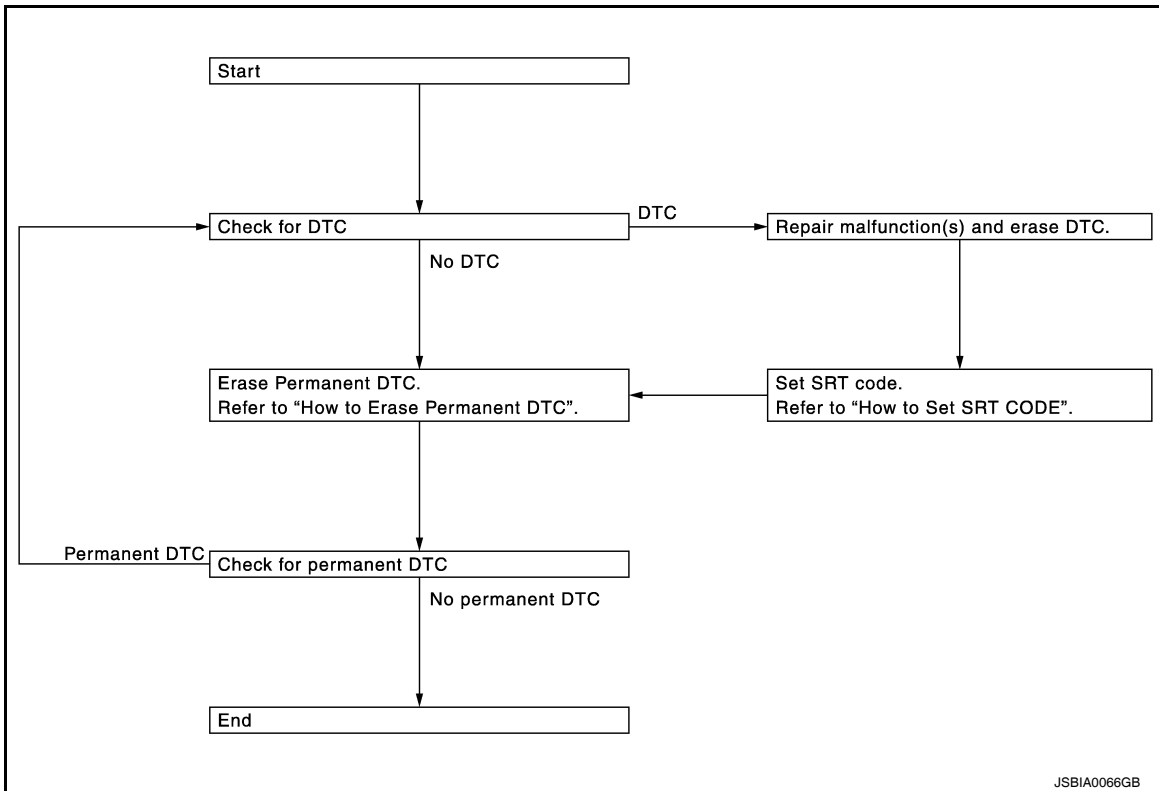
For permanent DTC items, MIL turns ON. Refer to [EC-542, "Emission-related Diagnostic Information"](#), "EMISION-RELATED DIAGNOSTIC INFORMATION ITEMS".

Permanent DTC Set Timing

The setting timing of permanent DTC is stored in ECM with the lighting of MIL when a DTC is confirmed.

Permanent DTC Service Procedure

ON BOARD DIAGNOSTIC (OBD) SYSTEM



JSBIA0066GB

How to Display Permanent DTC Status

Ⓟ WITH CONSULT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select "PERMANENT DTC STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT-III.

NOTE:

Permanent DTCs stored in ECM memory are displayed on the CONSULT-III screen to show if a driving pattern required for erasing permanent DTCs is complete (CMPLT) or incomplete (INCMP).

CAUTION:

Since the "PERMANENT DTC STATUS" screen displays the previous trip information, repeat the following twice to update the information: "Ignition switch OFF", "Wait for more than 10 seconds" and "Ignition switch ON".

PERMANENT DTC & SRT CONFIRMATION : PERMANENT DTC STATUS

CAUTION:
Turn ignition switch from ON to OFF twice to update the information on the status screen.

PERMANENT DTC	DRIVING PATTERN B	DRIVING PATTERN D
XXXX	INCMP	INCMP
XXXX	CMPLT	INCMP
XXXX	INCMP	CMPLT
XXXX	CMPLT	INCMP
XXXX	INCMP	INCMP
XXXX	INCMP	INCMP

The previous trip information is displayed. ↑

JSBIA0062GB

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]

WITH GST

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select Service \$0A with GST (Generic Scan Tool).

TEST VALUE AND TEST LIMIT (GST ONLY — NOT APPLICABLE TO CONSULT-III)

The following is the information specified in Service \$06 of SAE J1979/ISO 15031-5.

The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

These data (test value and test limit) are specified by On Board Monitor ID (OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.

The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (eg., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	01H	Air fuel ratio (A/F) sensor 1 (Bank 1)	P0131	83H	0BH	Minimum sensor output voltage for test cycle
			P0131	84H	0BH	Maximum sensor output voltage for test cycle
			P0130	85H	0BH	Minimum sensor output voltage for test cycle
			P0130	86H	0BH	Maximum sensor output voltage for test cycle
			P0133	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0133	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A00	89H	84H	The amount of shift in air fuel ratio
			P2A00	8AH	84H	The amount of shift in air fuel ratio
			P0130	8BH	0BH	Difference in sensor output voltage
			P0133	8CH	83H	Response gain at the limited frequency
			P014C	8DH	04H	O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 1
			P014C	8EH	04H	O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 1
			P014D	8FH	84H	O2 Sensor Slow Response - Lean to Rich Bank 1 Sensor 1
			P014D	90H	84H	O2 Sensor Slow Response - Lean to Rich Bank 1 Sensor 1
			P015A	91H	01H	O2 Sensor Delayed Response - Rich to Lean Bank 1 Sensor 1
			P015A	92H	01H	O2 Sensor Delayed Response - Rich to Lean Bank 1 Sensor 1
	P015B	93H	01H	O2 Sensor Delayed Response - Lean to Rich Bank 1 Sensor 1		
	P015B	94H	01H	O2 Sensor Delayed Response - Lean to Rich Bank 1 Sensor 1		
	02H	Heated oxygen sensor 2 (Bank 1)	P0138	07H	0CH	Minimum sensor output voltage for test cycle
			P0137	08H	0CH	Maximum sensor output voltage for test cycle
P0138			80H	0CH	Sensor output voltage	
P0139			81H	0CH	Difference in sensor output voltage	
03H	Heated oxygen sensor 3 (Bank 1)	P0143	07H	0CH	Minimum sensor output voltage for test cycle	
		P0144	08H	0CH	Maximum sensor output voltage for test cycle	
		P0146	80H	0CH	Sensor output voltage	
		P0145	81H	0CH	Difference in sensor output voltage	

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P0151	83H	0BH	Minimum sensor output voltage for test cycle
			P0151	84H	0BH	Maximum sensor output voltage for test cycle
			P0150	85H	0BH	Minimum sensor output voltage for test cycle
			P0150	86H	0BH	Maximum sensor output voltage for test cycle
			P0153	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0153	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A03	89H	84H	The amount of shift in air fuel ratio
			P2A03	8AH	84H	The amount of shift in air fuel ratio
			P0150	8BH	0BH	Difference in sensor output voltage
			P0153	8CH	83H	Response gain at the limited frequency
			P014E	8DH	04H	O2 Sensor Slow Response - Rich to Lean Bank 2 Sensor 1
			P014E	8EH	04H	O2 Sensor Slow Response - Rich to Lean Bank 2 Sensor 1
			P014F	8FH	84H	O2 Sensor Slow Response - Lean to Rich Bank 2 Sensor 1
			P014F	90H	84H	O2 Sensor Slow Response - Lean to Rich Bank 2 Sensor 1
			P015C	91H	01H	O2 Sensor Delayed Response - Rich to Lean Bank 2 Sensor 1
			P015C	92H	01H	O2 Sensor Delayed Response - Rich to Lean Bank 2 Sensor 1
			P015D	93H	01H	O2 Sensor Delayed Response - Lean to Rich Bank 2 Sensor 1
			P015D	94H	01H	O2 Sensor Delayed Response - Lean to Rich Bank 2 Sensor 1
	06H	Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle
			P0157	08H	0CH	Maximum sensor output voltage for test cycle
			P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
	07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle
			P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
CATALYST	21H	Three way catalyst function (Bank1)	P0420	80H	01H	O2 storage index
			P0420	82H	01H	Switching time lag engine exhaust index value
			P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2423	84H	84H	O2 storage index in HC trap catalyst
	22H	Three way catalyst function (Bank2)	P0430	80H	01H	O2 storage index
			P0430	82H	01H	Switching time lag engine exhaust index value
			P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst
EGR SYSTEM	31H	EGR function	P0400	80H	96H	Low Flow Faults: EGR temp change rate (short term)
			P0400	81H	96H	Low Flow Faults: EGR temp change rate (long term)
			P0400	82H	96H	Low Flow Faults: Difference between max EGR temp and EGR temp under idling condition
			P0400	83H	96H	Low Flow Faults: Max EGR temp
			P1402	84H	96H	High Flow Faults: EGR temp increase rate
VVT SYSTEM	35H	VVT Monitor (Bank1)	P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
	36H	VVT Monitor (Bank2)	P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
EVAP SYSTEM	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3BH	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)
	3CH	EVAP control system leak (Very small leak)	P0456	80H	05H	Leak area index (for more than 0.02 inch)
			P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
			P0456	82H	FDH	Internal pressure of EVAP system at the end of monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close
O2 SENSOR HEATER	41H	A/F sensor 1 heater (Bank 1)	Low Input:P0031 High Input:P0032	81H	0BH	Converted value of Heater electric current to voltage
	42H	Heated oxygen sensor 2 heater (Bank 1)	Low Input:P0037 High Input:P0038	80H	0CH	Converted value of Heater electric current to voltage
	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of Heater electric current to voltage
	45H	A/F sensor 1 heater (Bank 2)	Low Input:P0051 High Input:P0052	81H	0BH	Converted value of Heater electric current to voltage
	46H	Heated oxygen sensor 2 heater (Bank 2)	Low Input:P0057 High Input:P0058	80H	0CH	Converted value of Heater electric current to voltage
	47H	Heated oxygen sensor 3 heater (Bank 2)	P0063	80H	0CH	Converted value of Heater electric current to voltage
Secondary Air	71H	Secondary Air system	P0411	80H	01H	Secondary Air Injection System Incorrect Flow Detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary Air Injection System Insufficient Flow
			P2445	82H	01H	Secondary Air Injection System Pump Stuck Off
			P2448	83H	01H	Secondary Air Injection System High Airflow
			Bank1: P2440 Bank2: P2442	84H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2440	85H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2444	86H	01H	Secondary Air Injection System Pump Stuck On
FUEL SYSTEM	81H	Fuel injection system function (Bank 1)	P0171 or P0172	80H	2FH	Long term fuel trim
			P0171 or P0172	81H	24H	The number of lambda control clamped
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim
			P0174 or P0175	81H	24H	The number of lambda control clamped

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A1H	Multiple Cylinder Misfires	P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second cylinder
			P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000 revolution of the fourth cylinder
			P0305	84H	24H	Misfiring counter at 1000 revolution of the fifth cylinder
			P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder
			P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder
			P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder
			P0300	88H	24H	Misfiring counter at 1000 revolution of the multiple cylinders
			P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder
			P0302	8AH	24H	Misfiring counter at 200 revolution of the second cylinder
			P0303	8BH	24H	Misfiring counter at 200 revolution of the third cylinder
			P0304	8CH	24H	Misfiring counter at 200 revolution of the fourth cylinder
			P0305	8DH	24H	Misfiring counter at 200 revolution of the fifth cylinder
			P0306	8EH	24H	Misfiring counter at 200 revolution of the sixth cylinder
			P0307	8FH	24H	Misfiring counter at 200 revolution of the seventh cylinder
			P0308	90H	24H	Misfiring counter at 200 revolution of the eighth cylinder
			P0300	91H	24H	Misfiring counter at 1000 revolution of the single cylinder
			P0300	92H	24H	Misfiring counter at 200 revolution of the single cylinder
			P0300	93H	24H	Misfiring counter at 200 revolution of the multiple cylinders

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A2H	No. 1 Cylinder Misfire	P0301	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0301	0CH	24H	Misfire counts for last/current driving cycles
	A3H	No. 2 Cylinder Misfire	P0302	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0302	0CH	24H	Misfire counts for last/current driving cycles
	A4H	No. 3 Cylinder Misfire	P0303	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0303	0CH	24H	Misfire counts for last/current driving cycles
	A5H	No. 4 Cylinder Misfire	P0304	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0304	0CH	24H	Misfire counts for last/current driving cycles
	A6H	No. 5 Cylinder Misfire	P0305	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0305	0CH	24H	Misfire counts for last/current driving cycles
	A7H	No. 6 Cylinder Misfire	P0306	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0306	0CH	24H	Misfire counts for last/current driving cycles
	A8H	No. 7 Cylinder Misfire	P0307	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0307	0CH	24H	Misfire counts for last/current driving cycles
	A9H	No. 8 Cylinder Misfire	P0308	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0308	0CH	24H	Misfire counts for last/current driving cycles

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC

 **With CONSULT-III**

NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
 - If the DTC is not for A/T or CVT related items (see [EC-503](#)), skip step 1.
1. Erase DTC in TCM.
 2. Select "ENGINE" with CONSULT-III.
 3. Select "SELF-DIAG RESULTS".

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[MR18DE]

< SERVICE INFORMATION >

4. Touch "ERASE". (The DTC in the ECM will be erased.)

With GST

NOTE:

If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.

1. Select Service \$04 with GST.

No Tools

NOTE:

If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.

1. Erase DTC in ECM. Refer to How to Erase Diagnostic Test Mode II (Self-diagnostic Results).

• **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**

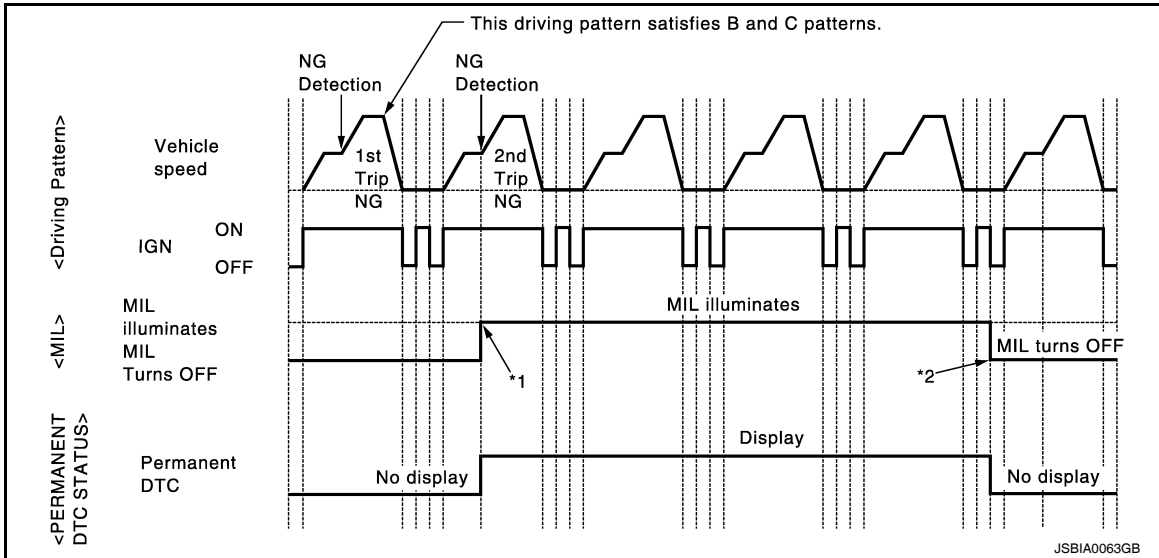
• **The following data are cleared when the ECM memory is erased.**

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

How to Erase Permanent DTC

When a DTC is stored in ECM

• When a DTC is stored in ECM and MIL is ON, a permanent DTC is erased with MIL shutoff if the same malfunction is not detected after performing the driving pattern for MIL shutoff three times in a row.



*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.

*2: MIL will turn off after vehicle is driven 3 times (pattern B) without any malfunctions.

When a DTC is not stored in ECM

• The erasing method depends on a permanent DTC stored in ECM. Refer to the following table.

×: Applicable —: Not applicable

Group *	Perform "DTC CONFIRMATION PROCEDURE" for applicable DTCs.	Driving pattern	
		B	D
A	×	—	—
B	—	×	×

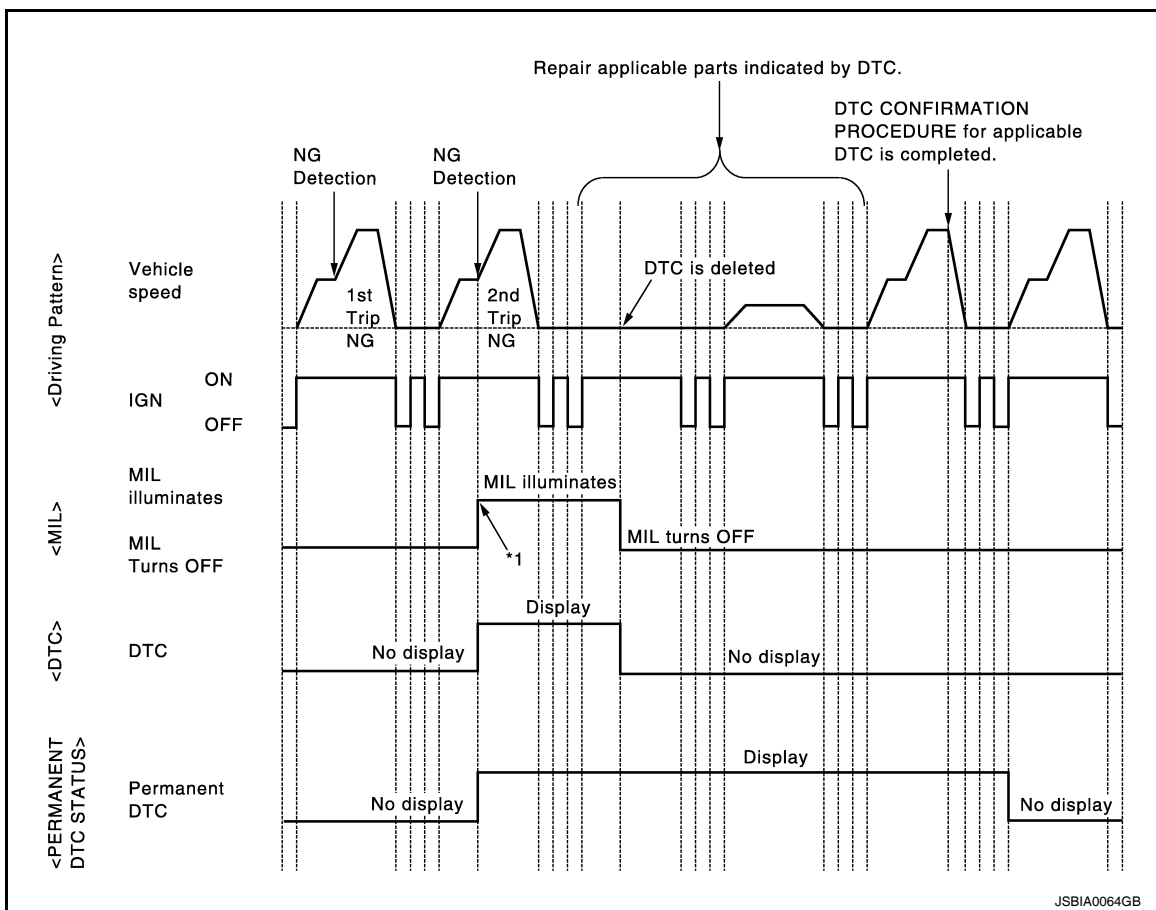
*: For group, refer to [EC-542. "Emission-related Diagnostic Information"](#), "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS".

Group A

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]



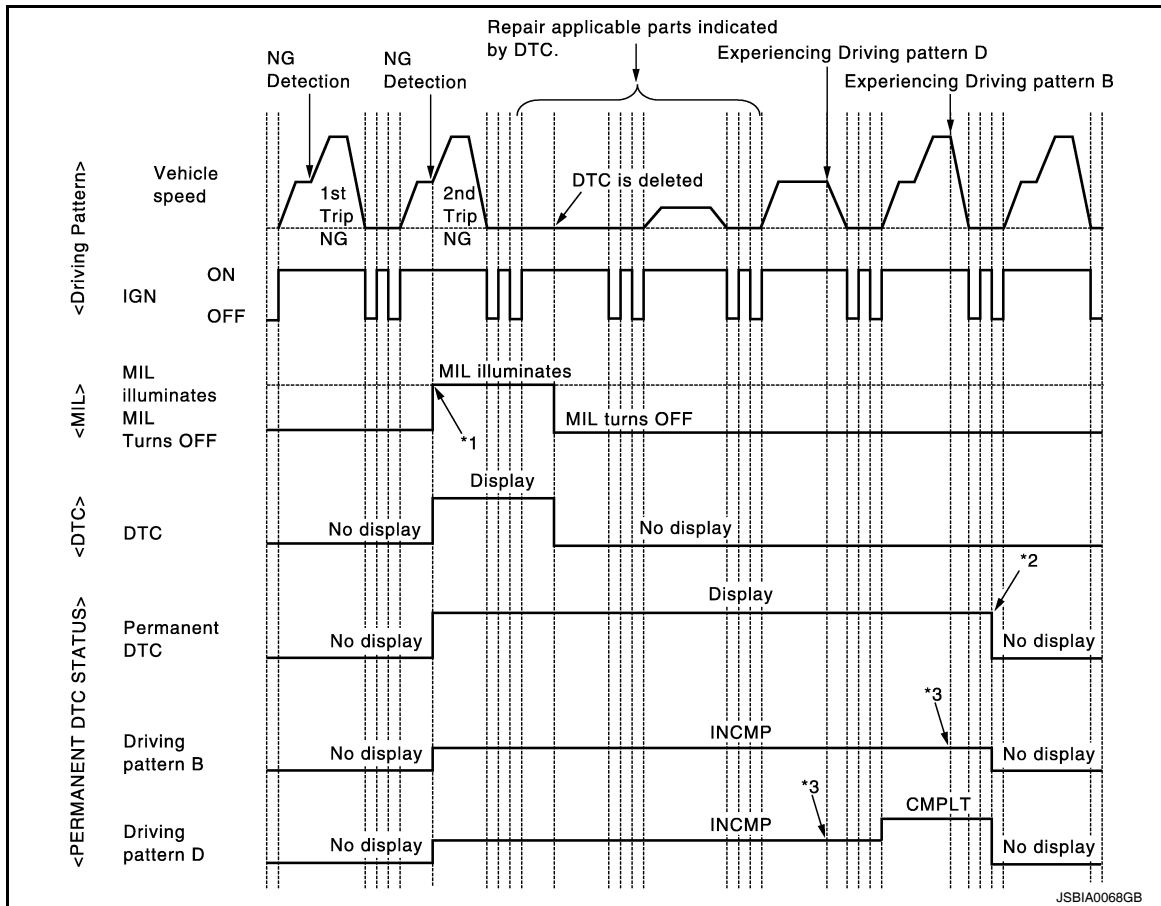
*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.

1. Turn ignition switch OFF and wait at least 10 seconds.
 2. Turn ignition switch ON.
 3. Turn ignition switch OFF and wait at least 10 seconds.
 4. Turn ignition switch ON.
 5. Check permanent DTC. Refer to [EC-542, "Emission-related Diagnostic Information"](#), "How to Display Permanent DTC Status".
 6. Perform "DTC CONFIRMATION PROCEDURE" for DTCs which are the same as permanent DTCs stored in ECM.
 7. Turn ignition switch OFF and wait at least 10 seconds.
 8. Turn ignition switch ON.
 9. Turn ignition switch OFF and wait at least 10 seconds.
 10. Turn ignition switch ON.
 11. Check permanent DTC. Refer to [EC-542, "Emission-related Diagnostic Information"](#), "How to Display Permanent DTC Status".
 12. Check that the permanent DTCs have been erased.
- Group B

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]



*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.

*2: After experiencing Driving pattern B and D, permanent DTC is erased.

*3: Indication does not change unless the ignition switch is turned from ON to OFF twice even after experiencing Driving pattern B or D.

NOTE:

- Drive the vehicle according to only driving patterns indicating "INCMP" in driving patterns B and D on the "PERMANENT DTC STATUS" screen.
 - When experiencing both driving pattern B and D during the same trip, the experience of driving pattern D is counted by priority.
1. Turn ignition switch OFF and wait at least 10 seconds.
 2. Turn ignition switch ON.
 3. Turn ignition switch OFF and wait at least 10 seconds.
 4. Turn ignition switch ON.
 5. Check permanent DTC. Refer to [EC-542. "Emission-related Diagnostic Information"](#), "How to Display Permanent DTC Status".
 6. Start engine and warm it up to normal operating temperature.
 7. Drive the vehicle according to driving pattern D.

CAUTION:

- Always drive at a safe speed.
 - Never erase self-diagnosis results.
 - If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B or D is reset.
 - If self-diagnosis results are erased during the trip of driving pattern B or D, an experience of driving pattern B and D during the same trip is not counted up.
8. Turn ignition switch OFF and wait at least 10 seconds.
 9. Turn ignition switch ON.
 10. Turn ignition switch OFF and wait at least 10 seconds.
 11. Turn ignition switch ON.
 12. Use "PERMANENT DTC WORK SUPPORT" to drive the vehicle according to driving pattern B.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]

CAUTION:

- Always drive at a safe speed.
- Never erase self-diagnosis results.
- If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B or D is reset.
- If self-diagnosis results are erased during the trip of driving pattern B or D, an experience of driving pattern B and D during the same trip is not counted up.

13. Turn ignition switch OFF and wait at least 10 seconds.
14. Turn ignition switch ON.
15. Turn ignition switch OFF and wait at least 10 seconds.
16. Turn ignition switch ON.
17. Check permanent DTC. Refer to [EC-542, "Emission-related Diagnostic Information"](#), "How to Display Permanent DTC Status".
18. Check that the permanent DTCs have been erased.

DRIVING PATTERN

Driving Pattern B

- Driving pattern B means a trip satisfying the following conditions.
 - Engine speed reaches 400 rpm or more.
 - Water temperature reaches 70°C (158°F) or more.
 - Vehicle speed of 70 – 120 km/h (44 – 75 MPH) is maintained for 60 seconds or more under the control of closed loop.
 - Vehicle speed of 30 – 60 km/h (19 – 37 MPH) is maintained for 10 seconds or more under the control of closed loop.
 - Under the closed loop control condition, the following state reaches 12 seconds or more in total: Vehicle speed of 4 km/h (2 MPH) or less with idling condition.
 - The state of driving at 10 km/h (7 MPH) or more reaches 10 minutes or more in total.
 - A lapse of 22 minutes or more after engine start.

CAUTION:

Always drive at a safe speed.

NOTE:

- Drive the vehicle at a constant velocity.
- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern B.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern B.

Driving Pattern D

- Driving pattern D means operating vehicle as per the following.
 - The state of driving at 40 km/h (25 MPH) reaches 300 seconds or more in total.
 - Idle speed lasts 30 seconds or more.
 - A lapse of 600 seconds or more after engine start.

CAUTION:

Always drive at a safe speed.

NOTE:

- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern D.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern D.

Malfunction Indicator Lamp (MIL)

INFOID:000000005532402

DESCRIPTION

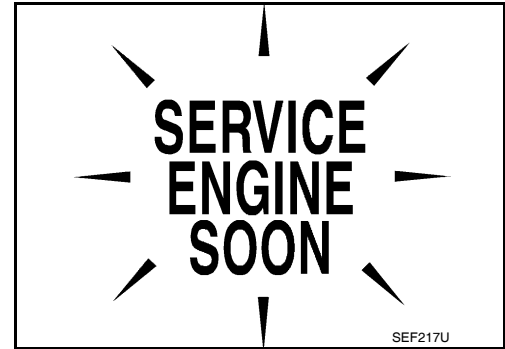
ON BOARD DIAGNOSTIC (OBD) SYSTEM

[MR18DE]

< SERVICE INFORMATION >






The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
If the MIL does not light up, refer to [DI-21](#) or see [EC-1033](#).
2. When the engine is started, the MIL should go off.
If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.



ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following three functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped 	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. <ul style="list-style-type: none"> • Misfire (Possible three way catalyst damage) • One trip detection diagnoses
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by MIL lighting up when there is malfunction on engine control system.

Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.

The fail-safe function also operates when above diagnoses except MIL circuit are detected, and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut
--	--

MIL Flashing Without DTC

When any SRT codes are not set, MIL may flash without DTC. For the details, refer to [EC-542, "Emission-related Diagnostic Information"](#).

HOW TO SWITCH DIAGNOSTIC TEST MODE

NOTE:

- It is better to count the time accurately with a clock.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

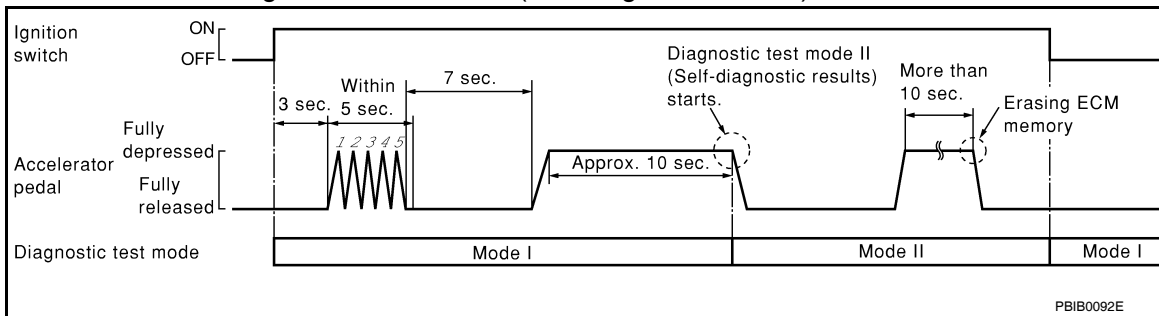
[MR18DE]

< SERVICE INFORMATION >

- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.

How to Set Diagnostic Test Mode II (Self-diagnostic Results)

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.
 - a. Fully depress the accelerator pedal.
 - b. Fully release the accelerator pedal.
3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL starts blinking.
4. Fully release the accelerator pedal.
ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).



How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results).
Refer to "How to Set Diagnostic Test Mode II (Self-diagnostic Results)".
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb.
Refer to [DI-21](#) or [EC-1033](#).

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

MIL	Condition
ON	When the malfunction is detected.
OFF	No malfunction

These DTC numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

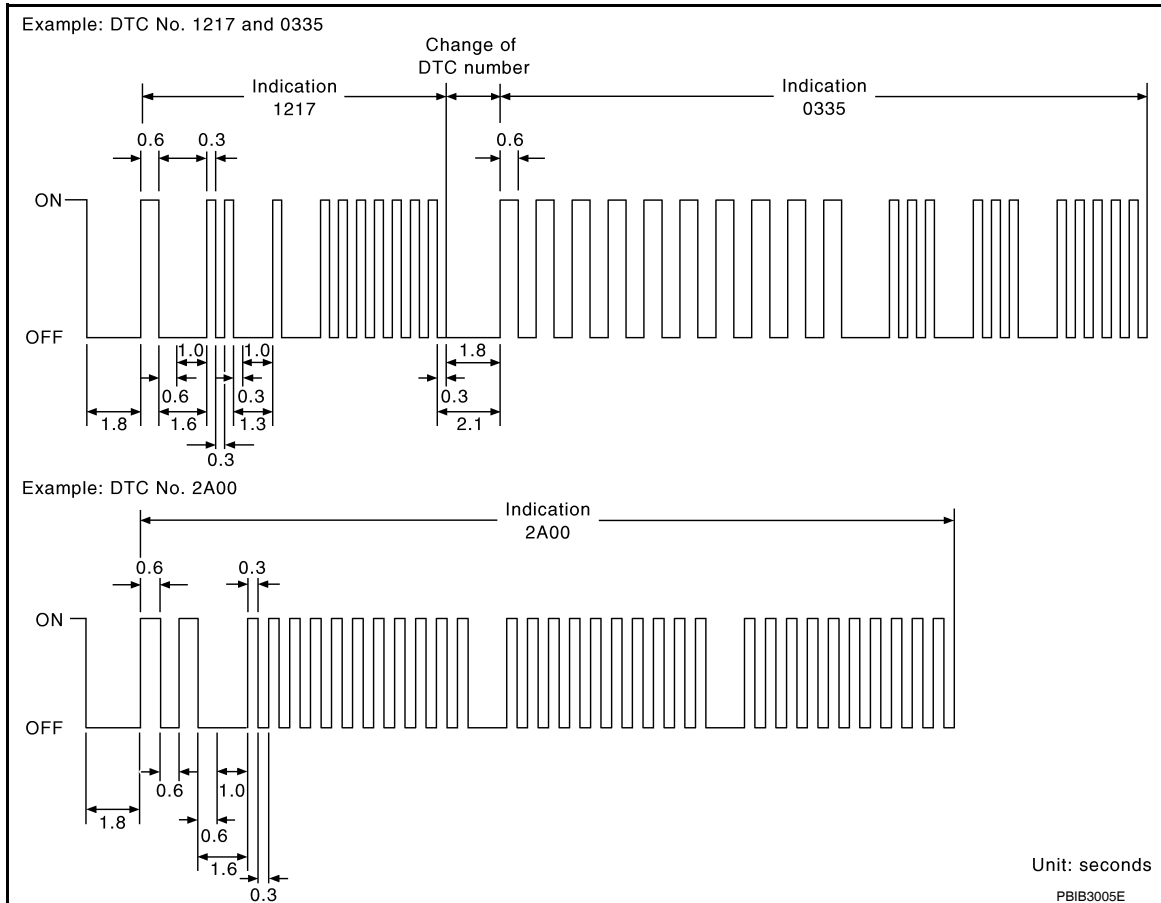
In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MIL as shown below. The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These uniden-

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]

tified codes can be identified by using the CONSULT-III or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The “A” is indicated by the number of eleven flash. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle. The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle. A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.

A change from one trouble code to another occurs at an interval of 1.8-second OFF.

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See [EC-503](#))

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

The DTC can be erased from the back-up memory in the ECM by depressing accelerator pedal.

Refer to "How to Erase Diagnostic Test Mode II (Self-diagnostic Results)".

- If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.
- Be careful not to erase the stored memory before starting trouble diagnoses.

OBD System Operation Chart

INFOID:000000005532403

RELATIONSHIP BETWEEN MIL, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to [EC-541, "Two Trip Detection Logic"](#).
- The MIL will go off after the vehicle is driven 3 times (driving pattern B) with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[MR18DE]

< SERVICE INFORMATION >

C) without the same malfunction recurring. The "TIME" in "SELF-DIAGNOSTIC RESULTS" mode of CONSULT-III will count the number of times the vehicle is driven.

- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

SUMMARY CHART

Items	Fuel Injection System	Misfire	Other
MIL (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns B and C under "Fuel Injection System" and "Misfire", see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM".

For details about patterns A and B under "Other", see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM".

*1: Clear timing is at the moment OK is detected.

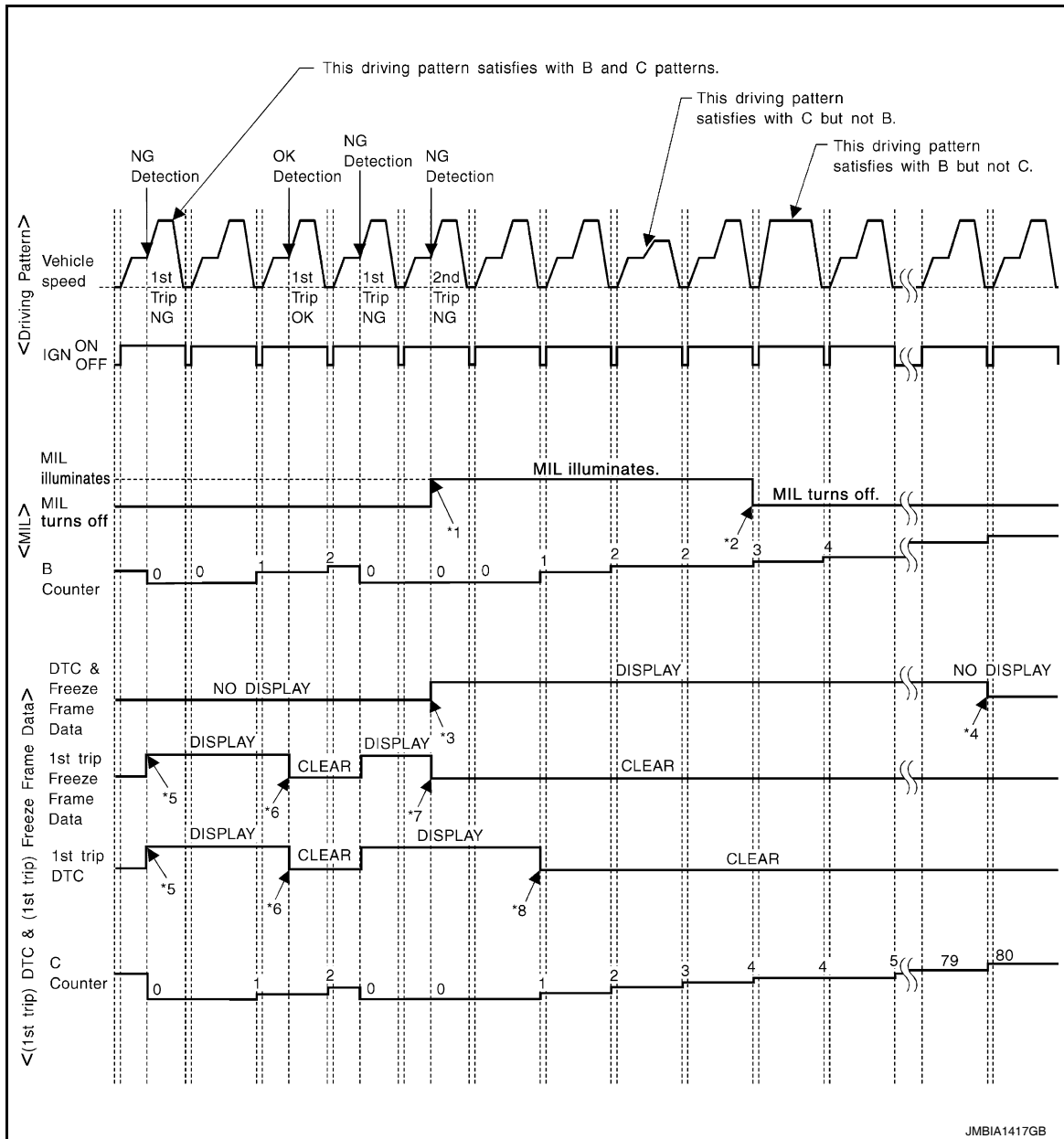
*2: Clear timing is when the same malfunction is detected in the 2nd trip.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]



- *1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.
- *2: MIL will turn off after vehicle is driven 3 times (pattern B) without any malfunctions.
- *3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.
- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- *5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- *6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.
- *8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[MR18DE]

< SERVICE INFORMATION >

All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunction.
- The MIL will go off when the B counter reaches 3. (*2 in "OBD SYSTEM OPERATION CHART")

<Driving Pattern C>

Driving pattern C means the vehicle operation as follows:

The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data) ± 375 rpm

Calculated load value: (Calculated load value in the freeze frame data) $\times (1 \pm 0.1)$ [%]

Engine coolant temperature (T) condition:

- When the freeze frame data shows lower than 70°C (158°F), "T" should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), "T" should be higher than or equal to 70°C (158°F).

Example:

If the stored freeze frame data is as follows:

Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)

To be satisfied with driving pattern C, the vehicle should run under the following conditions:

Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

- The C counter will be cleared when the malfunction is detected regardless of vehicle conditions above.
- The C counter will be counted up when vehicle conditions above is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

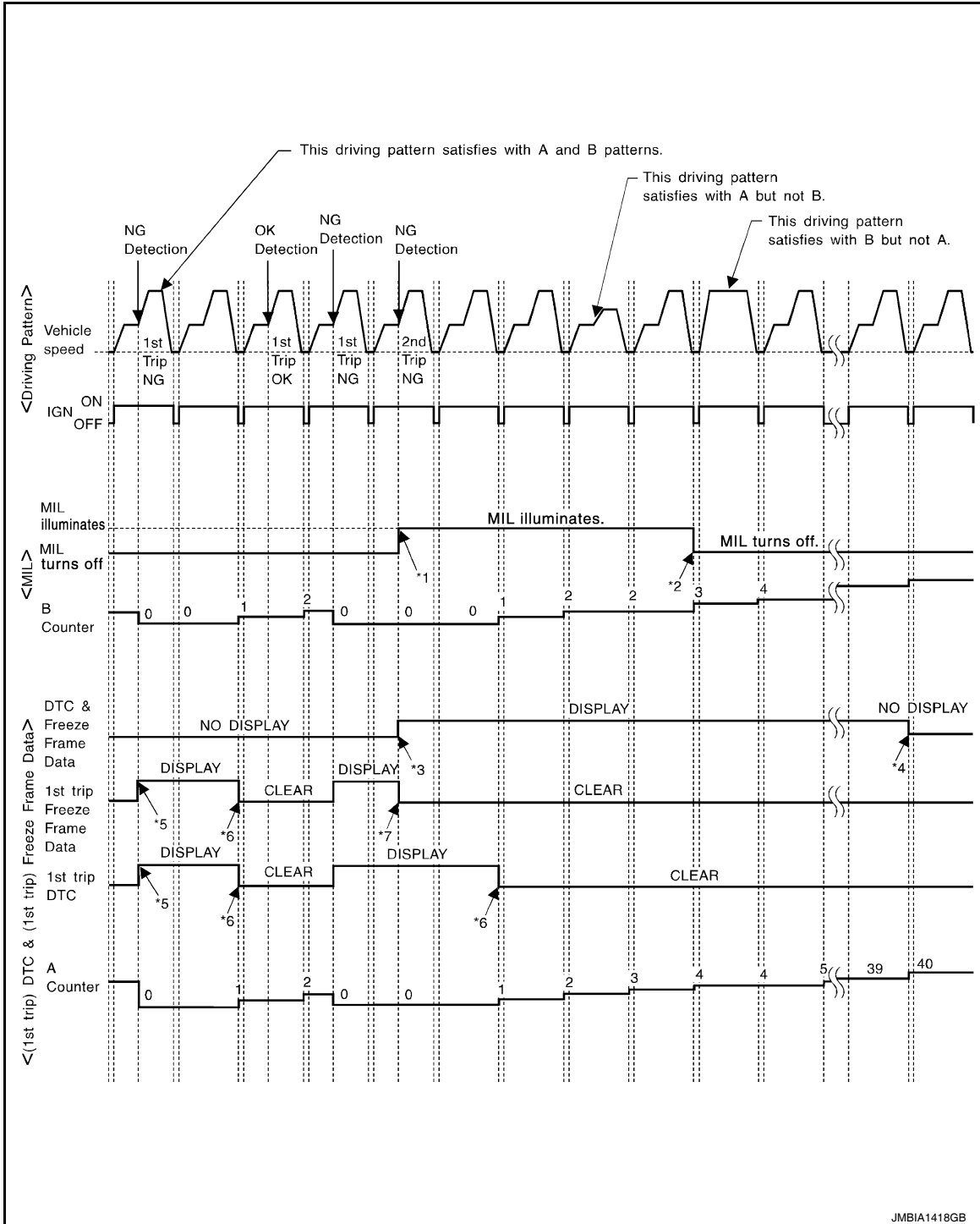
O

P

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[MR18DE]



JMBIA1418GB

*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.

*2: MIL will turn off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[MR18DE]

< SERVICE INFORMATION >

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction.
(The DTC and the freeze frame data still remain in ECM.)

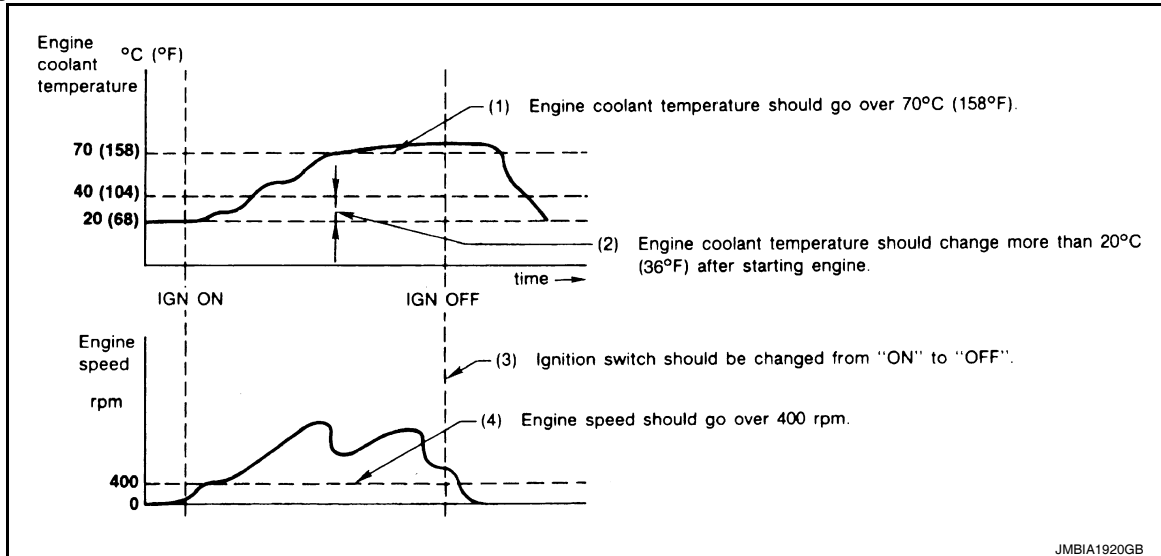
*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

EXPLANATION FOR DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

<Driving Pattern A>



- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:

All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will go off when the B counter reaches 3 (*2 in "OBD SYSTEM OPERATION CHART").

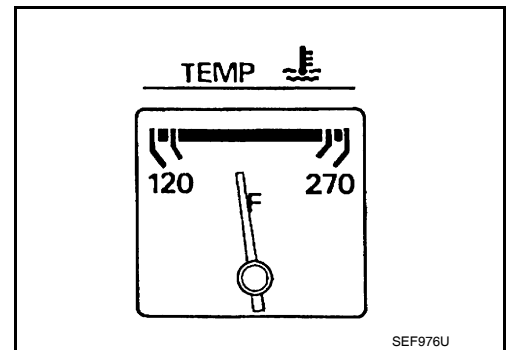
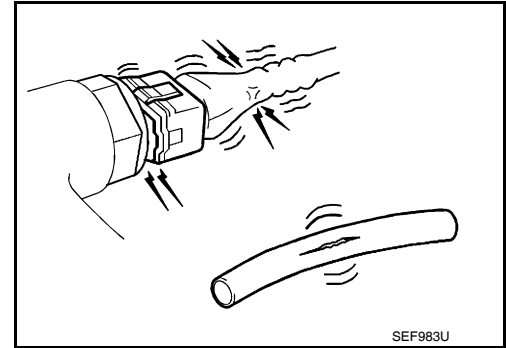
BASIC SERVICE PROCEDURE

Basic Inspection

INFOID:000000005532404

1. INSPECTION START

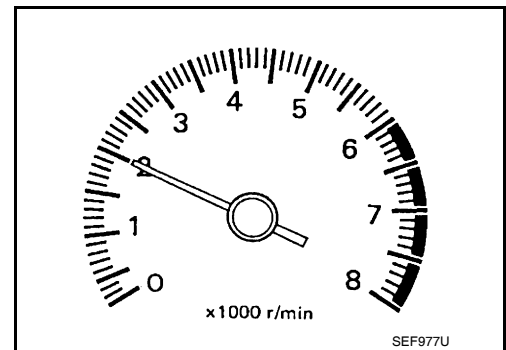
1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
 - Harness connectors for improper connections
 - Wiring harness for improper connections, pinches and cut
 - Vacuum hoses for splits, kinks and improper connections
 - Hoses and ducts for leaks
 - Air cleaner clogging
 - Gasket
3. Confirm that electrical or mechanical loads are not applied.
 - Headlamp switch is OFF.
 - Air conditioner switch is OFF.
 - Rear window defogger switch is OFF.
 - Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge. Ensure engine stays below 1,000 rpm.



5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT-III or GST.

OK or NG

- OK >> GO TO 3.
 NG >> GO TO 2.



2. REPAIR OR REPLACE

Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3.

3. CHECK TARGET IDLE SPEED

Ⓟ With CONSULT-III

1. Run engine at about 2,000 rpm for about 2 minutes under no load.

BASIC SERVICE PROCEDURE

[MR18DE]

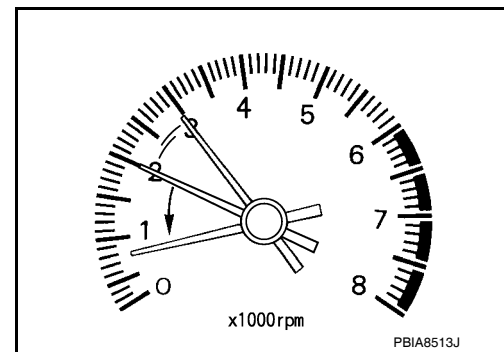
< SERVICE INFORMATION >

- Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
- Read idle speed in "DATA MONITOR" mode with CONSULT-III. Refer to [EC-578. "Idle Speed and Ignition Timing Check"](#).

M/T: 700 ± 50 rpm (in Neutral position)

A/T: 700 ± 50 rpm (in P or N position)

CVT: 700 ± 50 rpm (in P or N position)



⊗ Without CONSULT-III

- Run engine at about 2,000 rpm for about 2 minutes under no load.
- Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
- Check idle speed. Refer to [EC-578. "Idle Speed and Ignition Timing Check"](#).

M/T: 700 ± 50 rpm (in Neutral position)

A/T: 700 ± 50 rpm (in P or N position)

CVT: 700 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 10.

NG >> GO TO 4.

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- Stop engine.
- Perform [EC-580. "Accelerator Pedal Released Position Learning"](#).

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-580. "Throttle Valve Closed Position Learning"](#).

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-580. "Idle Air Volume Learning"](#).

Is Idle Air Volume Learning carried out successfully?

Yes or No

Yes >> GO TO 7.

No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

Ⓜ With CONSULT-III

- Start engine and warm it up to normal operating temperature.
- Read idle speed in "DATA MONITOR" mode with CONSULT-III. Refer to [EC-578. "Idle Speed and Ignition Timing Check"](#).

M/T: 700 ± 50 rpm (in Neutral position)

A/T: 700 ± 50 rpm (in P or N position)

CVT: 700 ± 50 rpm (in P or N position)

⊗ Without CONSULT-III

- Start engine and warm it up to normal operating temperature.
- Check idle speed. Refer to [EC-578. "Idle Speed and Ignition Timing Check"](#).

M/T: 700 ± 50 rpm (in Neutral position)

A/T: 700 ± 50 rpm (in P or N position)

CVT: 700 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 10.

NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Check crankshaft position sensor (POS) and circuit.
Refer to [EC-793](#).
- Check camshaft position sensor (PHASE) and circuit.
Refer to [EC-799](#).

OK or NG

OK >> GO TO 9.

NG >> 1. Repair or replace.
2. GO TO 4.

9. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs.
Refer to [BL-249, "ECM Re-communicating Function"](#).

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
 2. Check ignition timing with a timing light.
Refer to [EC-578, "Idle Speed and Ignition Timing Check"](#).
- Timing indicator (1)

M/T: 13 ± 5° BTDC (in Neutral position)

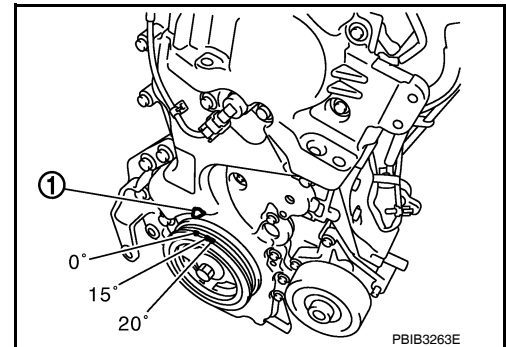
A/T: 13 ± 5° BTDC (in P or N position)

CVT: 13 ± 5° BTDC (in P or N position)

OK or NG

OK >> GO TO 19.

NG >> GO TO 11.



11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-580, "Throttle Valve Closed Position Learning"](#).

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-580, "Idle Air Volume Learning"](#).

Is Idle Air Volume Learning carried out successfully?

Yes or No

< SERVICE INFORMATION >

- Yes >> GO TO 14.
 No >> 1. Follow the instruction of Idle Air Volume Learning.
 2. GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in "DATA MONITOR" mode with CONSULT-III. Refer to [EC-578, "Idle Speed and Ignition Timing Check"](#).

M/T: 700 ± 50 rpm (in Neutral position)

A/T: 700 ± 50 rpm (in P or N position)

CVT: 700 ± 50 rpm (in P or N position)

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to [EC-578, "Idle Speed and Ignition Timing Check"](#).

M/T: 700 ± 50 rpm (in Neutral position)

A/T: 700 ± 50 rpm (in P or N position)

CVT: 700 ± 50 rpm (in P or N position)

OK or NG

- OK >> GO TO 15.
 NG >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
 2. Check ignition timing with a timing light.
 Refer to [EC-578, "Idle Speed and Ignition Timing Check"](#).
- Timing indicator (1)

M/T: 13 ± 5° BTDC (in Neutral position)

A/T: 13 ± 5° BTDC (in P or N position)

CVT: 13 ± 5° BTDC (in P or N position)

OK or NG

- OK >> GO TO 19
 NG >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to [EM-157, "Removal and Installation"](#).

OK or NG

- OK >> GO TO 17.
 NG >> 1. Repair the timing chain installation.
 2. GO TO 4.

17. DETECT MALFUNCTIONING PART

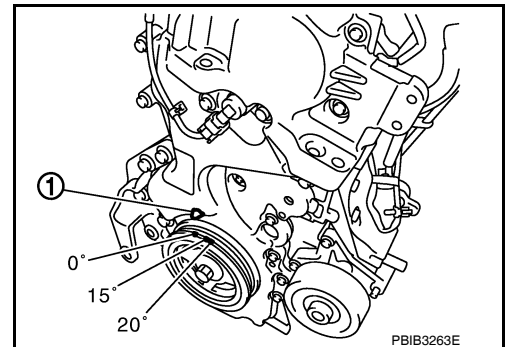
Check the following.

- Check crankshaft position sensor (POS) and circuit.
 Refer to [EC-793](#).
- Check camshaft position sensor (PHASE) and circuit.
 Refer to [EC-799](#).

OK or NG

- OK >> GO TO 18.
 NG >> 1. Repair or replace.
 2. GO TO 4.

18. CHECK ECM FUNCTION



BASIC SERVICE PROCEDURE

[MR18DE]

< SERVICE INFORMATION >

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs.
Refer to [BL-249. "ECM Re-communicating Function"](#).

>> GO TO 4.

19.INSPECTION END

Did you replace ECM, referring this Basic Inspection procedure?

Yes or No


- Yes >> 1. Perform [EC-580. "VIN Registration"](#).
2. **INSPECTION END**
- No >> **INSPECTION END**

Idle Speed and Ignition Timing Check

INFOID:000000005532405

IDLE SPEED


 With CONSULT-III
Check idle speed in "DATA MONITOR" mode with CONSULT-III.

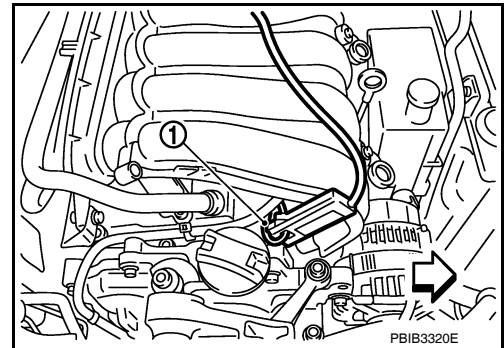
 With GST
Check idle speed in Service \$01 with GST.

IGNITION TIMING

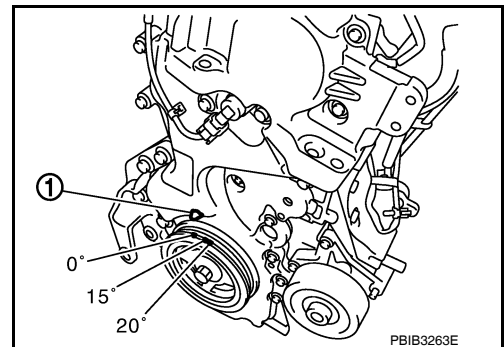
Any of following two methods may be used.

Method A

1. Attach timing light to loop wire (1) as shown.
 - : Vehicle front



2. Check ignition timing.
 - Timing indicator (1)



Method B

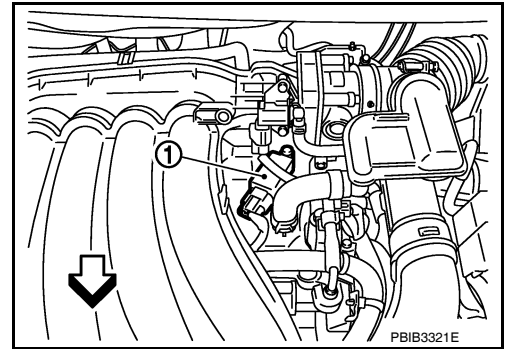
1. Remove No. 4 ignition coil (1).

BASIC SERVICE PROCEDURE

[MR18DE]

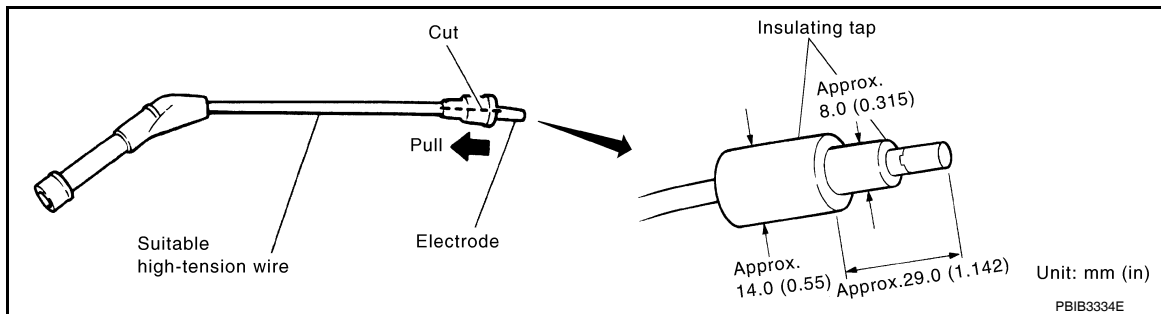
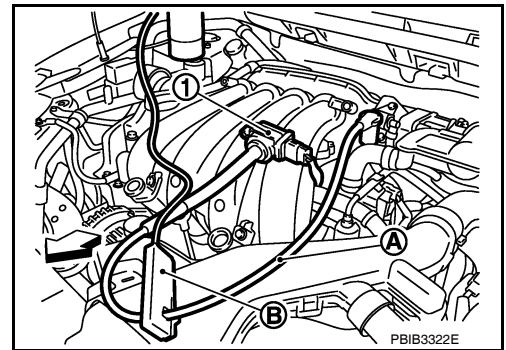
< SERVICE INFORMATION >

- ⇐: Vehicle front

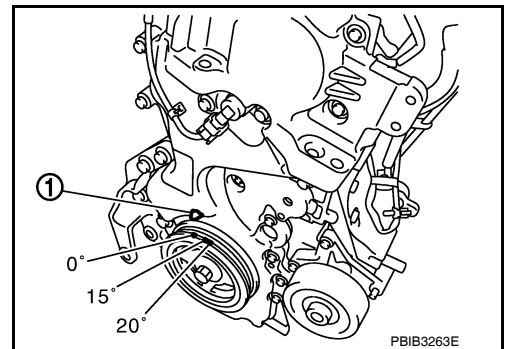


2. Connect No. 4 ignition coil (1) and No. 4 spark plug with suitable high-tension wire (A) as shown, and attach timing light clamp (B) to this wire.

- ⇐: Vehicle front



3. Check ignition timing.
 - Timing indicator (1)



Procedure After Replacing ECM

INFOID:000000005532406

When replacing ECM, the following procedure must be performed.

1. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to [BL-249, "ECM Re-communicating Function"](#).
2. Perform [EC-580, "VIN Registration"](#).
3. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).
4. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).

BASIC SERVICE PROCEDURE

[MR18DE]

< SERVICE INFORMATION >

5. Perform [EC-580, "Idle Air Volume Learning"](#).

VIN Registration

INFOID:000000005532407

DESCRIPTION

VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced.

NOTE:

Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).

OPERATION PROCEDURE

④ With CONSULT-III

1. Check the VIN of the vehicle and note it. Refer to [GI-43, "Model Variation"](#).
2. Turn ignition switch ON and engine stopped.
3. Select "VIN REGISTRATION" in "WORK SUPPORT" mode.
4. Follow the instruction of CONSULT-III display.

Accelerator Pedal Released Position Learning

INFOID:000000005532408

DESCRIPTION

Accelerator Pedal Released Position Learning is an operation to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.

OPERATION PROCEDURE

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 2 seconds.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and wait at least 2 seconds.
5. Turn ignition switch OFF and wait at least 10 seconds.

Throttle Valve Closed Position Learning

INFOID:000000005532409

DESCRIPTION

Throttle Valve Closed Position Learning is an operation to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

OPERATION PROCEDURE

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

Idle Air Volume Learning

INFOID:000000005532410

DESCRIPTION

Idle Air Volume Learning is an operation to learn the idle air volume that keeps each engine within the specific range. It must be performed under any of the following conditions:

- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

PREPARATION

Before performing Idle Air Volume Learning, make sure that all of the following conditions are satisfied. Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9 V (At idle)
- Engine coolant temperature: 70 - 95°C (158 - 203°F)
- Park/neutral position (PNP) switch (M/T): ON
Selector lever (A/T and CVT): P or N

BASIC SERVICE PROCEDURE

[MR18DE]

< SERVICE INFORMATION >

- Electric load switch: OFF
[Air conditioner, headlamp, rear window defogger]
On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is started the headlamp will not be illuminated.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
- Models with CONSULT-III (A/T and CVT models)
- Drive vehicle until "FLUID TEMP SE" in "DATA MONITOR" mode of "A/T" or "CVT" system indicates less than 0.9 V.
- Models without CONSULT-III (A/T and CVT models) and M/T models
- Drive vehicle for 10 minutes.

OPERATION PROCEDURE

With CONSULT-III

1. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).
2. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
6. Touch "START" and wait 20 seconds.
7. Make sure that "CMPLT" is displayed on CONSULT-III screen. If "CMPLT" is not displayed, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the DIAGNOSTIC PROCEDURE below.
8. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.
Refer to [EC-574, "Basic Inspection"](#).

Item	Specification
Idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position) CVT: 700 ± 50 rpm (in P or N position)
Ignition timing	M/T: 13 ± 5° BTDC (in Neutral position) A/T: 13 ± 5° BTDC (in P or N position) CVT: 13 ± 5° BTDC (in P or N position)

Without CONSULT-III

NOTE:

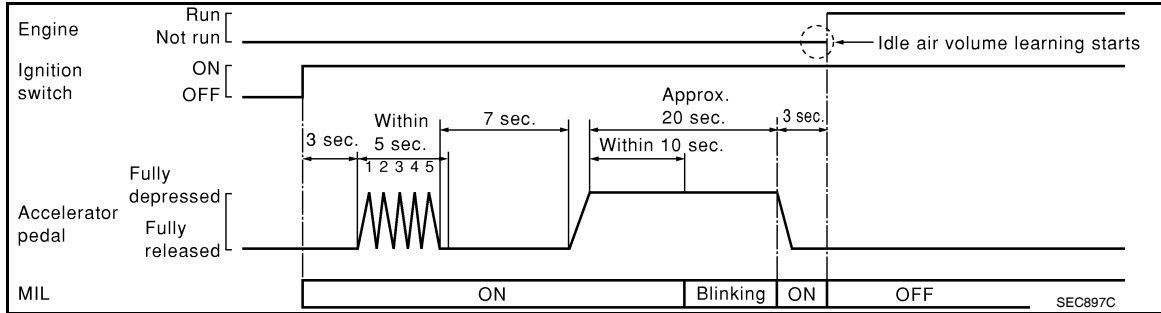
- **It is better to count the time accurately with a clock.**
 - **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
1. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).
 2. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
 3. Start engine and warm it up to normal operating temperature.
 4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
 5. Turn ignition switch OFF and wait at least 10 seconds.
 6. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
 7. Repeat the following procedure quickly five times within 5 seconds.
 - a. Fully depress the accelerator pedal.
 - b. Fully release the accelerator pedal.
 8. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turned ON.
 9. Fully release the accelerator pedal within 3 seconds after the MIL turned ON.
 10. Start engine and let it idle.

BASIC SERVICE PROCEDURE

[MR18DE]

< SERVICE INFORMATION >

11. Wait 20 seconds.



12. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. Refer to [EC-574, "Basic Inspection"](#).

Item	Specification
Idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position) CVT: 700 ± 50 rpm (in P or N position)
Ignition timing	M/T: 13 ± 5° BTDC (in Neutral position) A/T: 13 ± 5° BTDC (in P or N position) CVT: 13 ± 5° BTDC (in P or N position)

13. If idle speed and ignition timing are not within the specification, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the DIAGNOSTIC PROCEDURE below.

DIAGNOSTIC PROCEDURE

If idle air volume learning cannot be performed successfully, proceed as follows:

1. Check that throttle valve is fully closed.
2. Check PCV valve operation.
3. Check that downstream of throttle valve is free from air leakage.
4. When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident. It is useful to perform [EC-624](#).
5. If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:
 - Engine stalls.
 - Erroneous idle.

Fuel Pressure Check

INFOID:000000005532411

FUEL PRESSURE RELEASE

☑ With CONSULT-III

1. Turn ignition switch ON.
2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT-III.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.

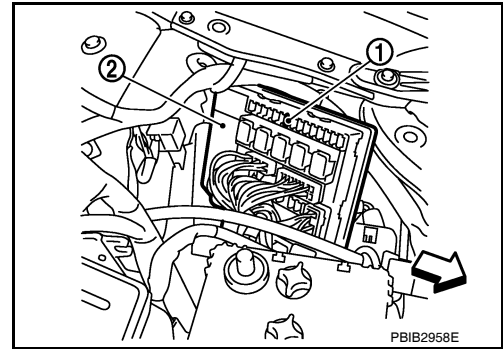
☒ Without CONSULT-III

BASIC SERVICE PROCEDURE

[MR18DE]

< SERVICE INFORMATION >

1. Remove fuel pump fuse (1) located in IPDM E/R (2).
 - ↶: Vehicle front
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.



FUEL PRESSURE CHECK

CAUTION:

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

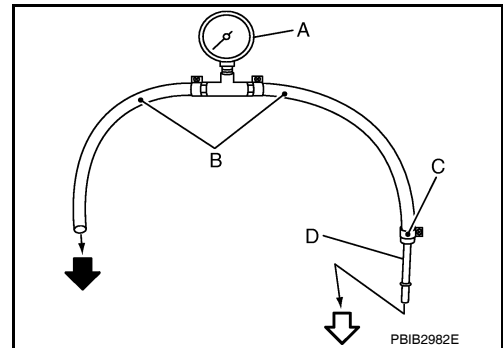
NOTE:

- Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because C11 models do not have fuel return system.
- The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.
- Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains seal ability with O-rings inside.
- Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.

1. Release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".

2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.

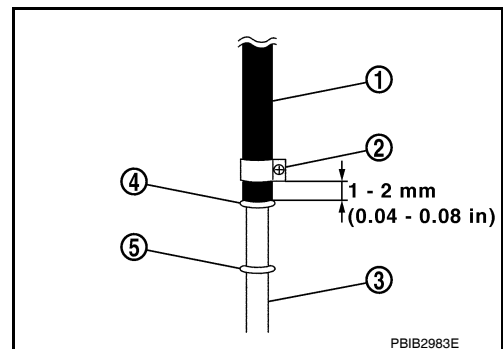
- ↶: To quick connector
- ↰: To fuel tube (engine side)
- C: Clamp
- Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
- To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
- Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
- Use Pressure Gauge to check fuel pressure.



3. Remove fuel hose. Refer to [EM-152. "Removal and Installation"](#).
 - Do not twist or kink fuel hose because it is plastic hose.

4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.

- No.2 spool (5)
- Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
- Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
- Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
- Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
- When reconnecting fuel line, always use new clamps.
- Use a torque driver to tighten clamps.
- Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).



Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg·m, 9 - 13 in·lb)

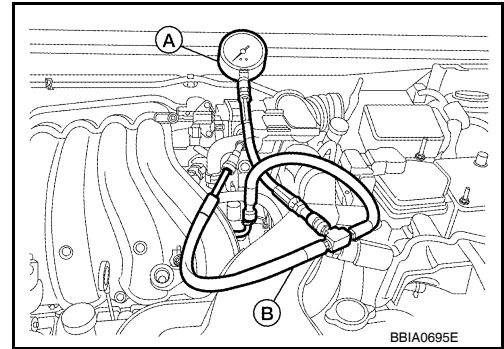
- Make sure that clamp screw does not contact adjacent parts.

BASIC SERVICE PROCEDURE

[MR18DE]

< SERVICE INFORMATION >

5. Connect fuel tube adapter to quick connector.
 - A: Fuel pressure gauge
 - B: Fuel hose for fuel pressure check
6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
7. Turn ignition switch ON and check for fuel leakage.
8. Start engine and check for fuel leakage.
9. Read the indication of fuel pressure gauge.
 - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
 - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.



At idling: Approximately 350 kPa (3.57 kg/cm², 51 psi)

10. If result is unsatisfactory, go to next step.
11. Check the following.
 - Fuel hoses and fuel tubes for clogging
 - Fuel filter for clogging
 - Fuel pump
 - Fuel pressure regulator for cloggingIf OK, replace fuel pressure regulator.
If NG, repair or replace.
12. Check the following.
 - Fuel hoses and fuel tubes for clogging
 - Fuel filter for clogging
 - Fuel pump
 - Fuel pressure regulator for cloggingIf OK, replace fuel pressure regulator.
If NG, repair or replace.
13. Before disconnecting Fuel Pressure Gauge and Fuel Pressure Adapter J-44321-6, release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".

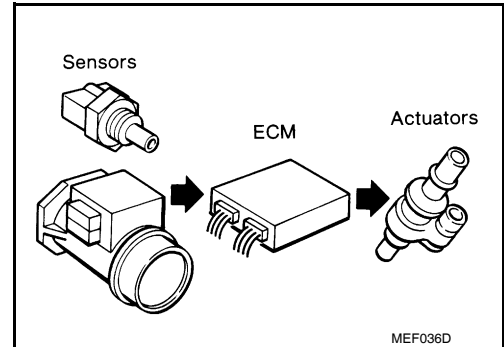
TROUBLE DIAGNOSIS

Trouble Diagnosis Introduction

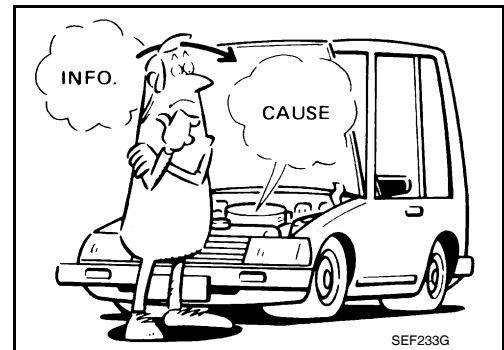
INFOID:000000005532412

INTRODUCTION

The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, fouled spark plugs, or other malfunctions with the engine.



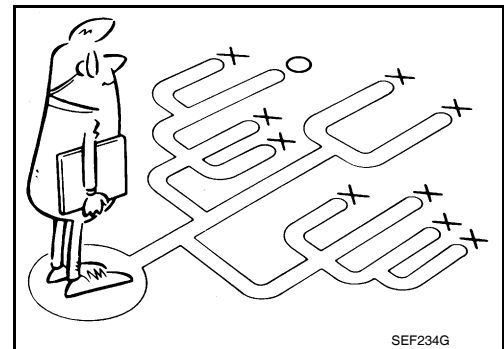
It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



A visual check only may not find the cause of the incidents. A road test with CONSULT-III (or GST) or a circuit tester connected should be performed. Follow the Work Flow on "WORK FLOW".

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a drivability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic Worksheet like the example on "Worksheet Sample" should be used.

Start your diagnosis by looking for conventional malfunctions first. This will help troubleshoot drivability malfunctions on an electronically controlled engine vehicle.



WORK FLOW

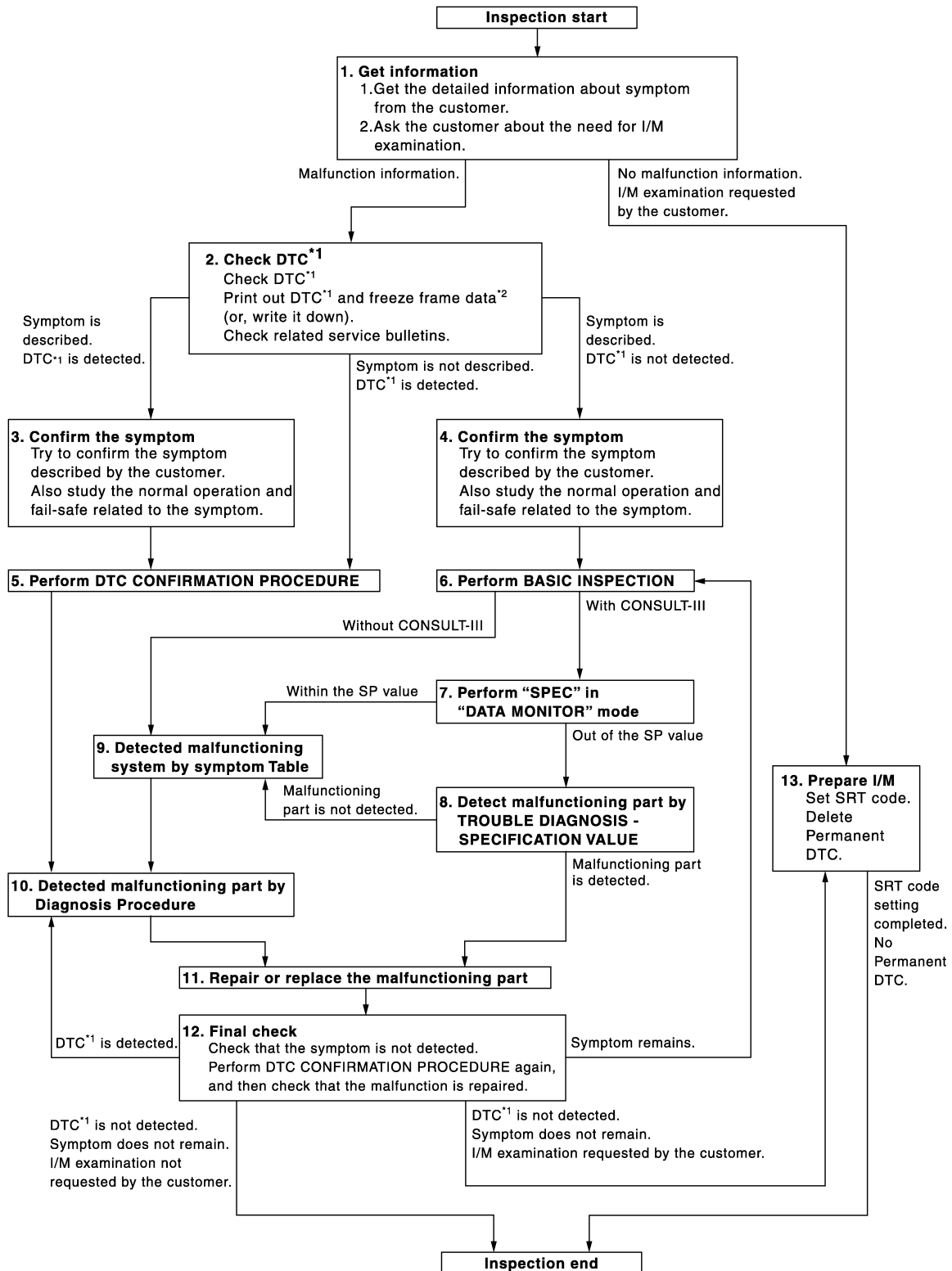
Overall Sequence

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]



JSBIA0067GB

*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

Detailed Flow

1. GET INFORMATION FOR SYMPTOM

TROUBLE DIAGNOSIS

[MR18DE]

< SERVICE INFORMATION >

1. Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the "Diagnostic Work Sheet".
2. Ask if the customer requests I/M examination.

Malfunction information, obtained>>GO TO 2.

No malfunction information, but a request for I/M examination>>GO TO 13.

2.CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is displayed.
 - Record DTC and freeze frame data. (Print them out with CONSULT-III or GST.)
 - Erase DTC. (Refer to [EC-542. "Emission-related Diagnostic Information"](#).)
 - Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to [EC-592. "Symptom Matrix Chart"](#).)
3. Check related service bulletins for information.

Are any symptoms described and any DTCs detected?

Symptom is described, DTC is detected>>GO TO 3.

Symptom is described, DTC is not detected>>GO TO 4.

Symptom is not described, DTC is detected>>GO TO 5.

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).

Also study the normal operation and fail-safe related to the symptom.

Diagnosis Work Sheet is useful to verify the incident.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.

Also study the normal operation and fail-safe related to the symptom.

Diagnosis Work Sheet is useful to verify the incident.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then make sure that DTC is detected again.

If two or more DTCs are detected, refer to [EC-590. "DTC Inspection Priority Chart"](#) and determine trouble diagnosis order.

NOTE:

- Freeze frame data is useful if the DTC is not detected.
- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.
 - If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIRMATION PROCEDURE.

Is DTC detected?

YES >> GO TO 10.

NO >> Check according to [EC-624. "Description"](#).

6.PERFORM BASIC INSPECTION

Perform [EC-574. "Basic Inspection"](#).

Do you have CONSULT-III?

YES >> GO TO 7.

NO >> GO TO 9.

< SERVICE INFORMATION >

7. PERFORM SPEC IN DATA MONITOR MODE**With CONSULT-III**

Make sure that "MAS A/F SE-B1", "MAS A/F SE-B2", "B/FUEL SCHDL", "A/F ALPHA-B1", and "A/F ALPHA-B2" are within the SP value using CONSULT-III "SPEC" in "DATA MONITOR" mode. Refer to [EC-624, "Inspection Procedure"](#).

Is the measurement value within the SP value?

YES >> GO TO 9.

NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to [EC-624, "Diagnosis Procedure"](#).

Is a malfunctioning part detected?

YES >> GO TO 11.

NO >> GO TO 9.

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to [EC-592, "Symptom Matrix Chart"](#) based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptoms.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to [GI-25, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

Is a malfunctioning part detected?

YES >> GO TO 11.

NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CONSULT-III. Refer to [EC-605, "ECM Terminal and Reference Value"](#), [EC-620, "CONSULT-III Reference Value in Data Monitor Mode"](#).

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it. Refer to [EC-542, "Emission-related Diagnostic Information"](#).

>> GO TO 12.

12. FINAL CHECK

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then make sure that the malfunction have been completely repaired.

When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 10.

YES-2 >> Symptom remains: GO TO 6.

NO-1 >> No request for I/M examination from the customer: Before returning the vehicle to the customer, always erase unnecessary DTC in ECM and TCM (Transmission Control Module). Refer to [EC-542, "Emission-related Diagnostic Information"](#).

NO-2 >> I/M examination, requested from the customer: GO TO 13.

13. PREPARE FOR I/M EXAMINATION

1. Set SRT codes. Refer to [EC-542, "Emission-related Diagnostic Information"](#).
2. Erase permanent DTCs. Refer to [EC-542, "Emission-related Diagnostic Information"](#).

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

>> INSPECTION END

DIAGNOSTIC WORKSHEET

Description

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.

In general, each customer feels differently about an incident. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet as shown in the following "Worksheet Sample" in order to organize all the information for troubleshooting.

Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

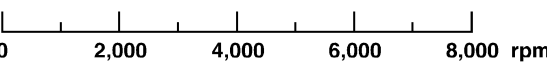
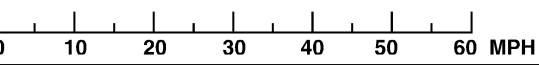
- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

KEY POINTS

WHAT Vehicle & engine model
WHEN Date, Frequencies
WHERE..... Road conditions
HOW Operating conditions,
Weather conditions,
Symptoms

SEF907L

Worksheet Sample

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Fuel and fuel filler cap		<input type="checkbox"/> Vehicle ran out of fuel causing misfire <input type="checkbox"/> Fuel filler cap was left off or incorrectly screwed on.	
Symptoms	<input type="checkbox"/> Startability	<input type="checkbox"/> Impossible to start <input type="checkbox"/> No combustion <input type="checkbox"/> Partial combustion <input type="checkbox"/> Partial combustion affected by throttle position <input type="checkbox"/> Partial combustion NOT affected by throttle position <input type="checkbox"/> Possible but hard to start <input type="checkbox"/> Others []	
	<input type="checkbox"/> Idling	<input type="checkbox"/> No fast idle <input type="checkbox"/> Unstable <input type="checkbox"/> High idle <input type="checkbox"/> Low idle <input type="checkbox"/> Others []	
	<input type="checkbox"/> Driveability	<input type="checkbox"/> Stumble <input type="checkbox"/> Surge <input type="checkbox"/> Knock <input type="checkbox"/> Lack of power <input type="checkbox"/> Intake backfire <input type="checkbox"/> Exhaust backfire <input type="checkbox"/> Others []	
	<input type="checkbox"/> Engine stall	<input type="checkbox"/> At the time of start <input type="checkbox"/> While idling <input type="checkbox"/> While accelerating <input type="checkbox"/> While decelerating <input type="checkbox"/> Just after stopping <input type="checkbox"/> While loading	
Incident occurrence		<input type="checkbox"/> Just after delivery <input type="checkbox"/> Recently <input type="checkbox"/> In the morning <input type="checkbox"/> At night <input type="checkbox"/> In the daytime	
Frequency		<input type="checkbox"/> All the time <input type="checkbox"/> Under certain conditions <input type="checkbox"/> Sometimes	
Weather conditions		<input type="checkbox"/> Not affected	
Weather		<input type="checkbox"/> Fine <input type="checkbox"/> Raining <input type="checkbox"/> Snowing <input type="checkbox"/> Others []	
Temperature		<input type="checkbox"/> Hot <input type="checkbox"/> Warm <input type="checkbox"/> Cool <input type="checkbox"/> Cold <input type="checkbox"/> Humid °F	
Engine conditions		<input type="checkbox"/> Cold <input type="checkbox"/> During warm-up <input type="checkbox"/> After warm-up Engine speed <div style="text-align: center;">  </div>	
Road conditions		<input type="checkbox"/> In town <input type="checkbox"/> In suburbs <input type="checkbox"/> Highway <input type="checkbox"/> Off road (up/down)	
Driving conditions		<input type="checkbox"/> Not affected <input type="checkbox"/> At starting <input type="checkbox"/> While idling <input type="checkbox"/> At racing <input type="checkbox"/> While accelerating <input type="checkbox"/> While cruising <input type="checkbox"/> While decelerating <input type="checkbox"/> While turning (RH/LH) Vehicle speed <div style="text-align: center;">  </div>	
Malfunction indicator lamp		<input type="checkbox"/> Turned on <input type="checkbox"/> Not turned on	

MTBL0017

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

DTC Inspection Priority Chart

INFOID:000000005532413

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	<ul style="list-style-type: none"> • U0101 U0140 U1001 CAN communication line • P0101 P0102 P0103 Mass air flow sensor • P0112 P0113 P0127 Intake air temperature sensor • P0116 P0117 P0118 P0125 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0128 Thermostat function • P0181 P0182 P0183 Fuel tank temperature sensor • P0327 P0328 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0460 P0461 P0462 P0463 Fuel level sensor • P0500 Vehicle speed sensor • P0605 P0607 ECM • P0643 Sensor power supply • P0705 Transmission range switch • P0850 Park/neutral position (PNP) switch • P1610 - P1615 NATS • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	<ul style="list-style-type: none"> • P0031 P0032 Air fuel ratio (A/F) sensor 1 heater • P0037 P0038 Heated oxygen sensor 2 heater • P0075 Intake valve timing control solenoid valve • P0130 P0131 P0132 P014C P014D P015A P015B P2A00 Air fuel ratio (A/F) sensor 1 • P0137 P0138 P0139 Heated oxygen sensor 2 • P0441 EVAP control system purge flow monitoring • P0443 P0444 P0445 EVAP canister purge volume control solenoid valve • P0447 P0448 EVAP canister vent control valve • P0451 P0452 P0453 EVAP control system pressure sensor • P1217 Engine over temperature (OVERHEAT) • P1805 Brake switch • P2100 P2103 Throttle control motor relay • P2101 Electric throttle control function • P2118 Throttle control motor
3	<ul style="list-style-type: none"> • P0011 Intake valve timing control • P0171 P0172 Fuel injection system function • P0300 - P0304 Misfire • P0420 Three way catalyst function • P0442 P0456 EVAP control system (SMALL LEAK, VERY SMALL LEAK) • P0455 EVAP control system (GROSS LEAK) • P0506 P0507 Idle speed control system • P0710 P0715 P0720 P0725 P0731 P0732 P0733 P0734 P0740 P0744 P0745 P0746 P0750 P0755 P0776 P0778 P0840 P0845 P1705 P1740 P1760 P1777 P1778 A/T or CVT related sensors, solenoid valves and switches • P1148 Closed loop control • P1211 TCS control unit • P1212 TCS communication line • P1421 Cold start control • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD vehicle speed sensor • P1715 Input speed sensor • P2119 Electric throttle control actuator

Fail-Safe Chart

INFOID:000000005532414

When the DTC listed below is detected, the ECM enters fail-safe mode and the MIL lights up.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

DTC No.	Detected items	Engine operating condition in fail-safe mode								
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.								
P0117 P0118	Engine coolant temperature sensor circuit	<p>Engine coolant temperature will be determined by ECM based on the following condition. CONSULT-III displays the engine coolant temperature decided by ECM.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;">Condition</th> <th style="width: 60%;">Engine coolant temperature decided (CONSULT-III display)</th> </tr> </thead> <tbody> <tr> <td>Just as ignition switch is turned ON or START</td> <td style="text-align: center;">40°C (104°F)</td> </tr> <tr> <td>Approx. 4 minutes or more after engine starting.</td> <td style="text-align: center;">80°C (176°F)</td> </tr> <tr> <td>Except as shown above</td> <td style="text-align: center;">40 - 80°C (104 - 176°F) (Depends on the time)</td> </tr> </tbody> </table> <p>When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.</p>	Condition	Engine coolant temperature decided (CONSULT-III display)	Just as ignition switch is turned ON or START	40°C (104°F)	Approx. 4 minutes or more after engine starting.	80°C (176°F)	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
Condition	Engine coolant temperature decided (CONSULT-III display)									
Just as ignition switch is turned ON or START	40°C (104°F)									
Approx. 4 minutes or more after engine starting.	80°C (176°F)									
Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)									
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	<p>The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.</p>								
P0643	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.								
P2100 P2103	Throttle control relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.								
P2101	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.								
P2118	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.								
P2119	Electric throttle control actuator	<p>(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.</p> <p>(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.</p> <p>(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P (A/T, CVT), Neutral (M/T) position, and engine speed will not exceed 1,000 rpm or more.</p>								
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	<p>The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.</p>								

- When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.
Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.
The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut
--	--

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

Symptom Matrix Chart

INFOID:000000005532415

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM												Reference	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-1014
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-582
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-1009
	Evaporative emission system	3	3	4	4	4	4	4	4	4	4	4			EC-525
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-538
	Incorrect idle speed adjustment						1	1	1	1		1			EC-574
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-952 , EC-963
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-574
	Ignition circuit	1	1	2	2	2		2	2			2			EC-1019
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-633
Mass air flow sensor circuit		1			2										EC-664 , EC-672
Engine coolant temperature sensor circuit					3										
Air fuel ratio (A/F) sensor 1 circuit			1	2	3	2		2	2			2			EC-704 , EC-710 , EC-716 , EC-750 , EC-989
Throttle position sensor circuit							2			2					EC-691 , EC-778 , EC-919 , EC-921 , EC-977
Accelerator pedal position sensor circuit				3	2	1									EC-896 , EC-965 , EC-970 , EC-982
Knock sensor circuit				2								3			EC-789
Crankshaft position sensor (POS) circuit		2	2												EC-793

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

	SYMPTOM												Reference	
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor (PHASE) circuit	3	2												EC-799
Vehicle speed signal circuit		2	3		3						3			EC-887
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-893
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-659
Park/neutral position (PNP) signal circuit			3		3		3	3			3			EC-901
Refrigerant pressure sensor circuit		2				3			3		4			EC-1028
Electrical load signal circuit							3							EC-1007
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	MTC-23
ABS actuator and electric unit (control unit)			4											BRC-10

1 - 6: The numbers refer to the order of inspection.

(continued on next table)

SYSTEM — ENGINE MECHANICAL & OTHER

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

		SYMPTOM												Reference		
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATSWATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		
Fuel	Fuel tank	5													FL-12	
	Fuel piping			5	5	5		5	5			5			FL-5	
	Vapor lock			5												—
	Valve deposit															—
	Poor fuel (Heavy weight gasoline, Low octane)	5			5	5	5		5	5			5			—
Air	Air duct														EM-135	
	Air cleaner														EM-135	
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)		5	5		5		5	5			5			EM-135	
	Electric throttle control actuator	5			5		5			5					EM-137	
	Air leakage from intake manifold/Collector/Gasket														EM-137	
Cranking	Battery	1	1	1		1		1	1					1	SC-7	
	Generator circuit														SC-22	
	Starter circuit	3													SC-16	
	Signal plate	6										1			EM-196	
	Park/neutral position (PNP) switch (M/T) Transmission range switch (A/T or CVT)	4													MT-57, AT-94, CVT-70	
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-182	
	Cylinder head gasket										4		3			
	Cylinder block															
	Piston												4			
	Piston ring															
	Connecting rod	6	6	6	6	6		6	6			6			EM-196	
	Bearing															
	Crankshaft															

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

		SYMPTOM												Reference	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Valve mechanism	Timing chain														EM-157
	Camshaft														EM-166
	Intake valve timing control	5	5	5	5	5		5	5			5			EM-157
	Intake valve												3		EM-185
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-140 , EX-11
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5			EM-143 , LU-20
	Oil level (Low)/Filthy oil														LU-17
Cooling	Radiator/Hose/Radiator filler cap														CO-41
	Thermostat									5					CO-46
	Water control valve														CO-48
	Water pump	5	5	5	5	5		5	5		4	5			CO-44
	Water gallery														CO-35
	Cooling fan														CO-43
	Coolant level (Low)/Contaminated coolant									5					CO-36
NVIS (NISSAN Vehicle Immobilizer System-NATS)		1	1												BL-257

1 - 6: The numbers refer to the order of inspection.

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

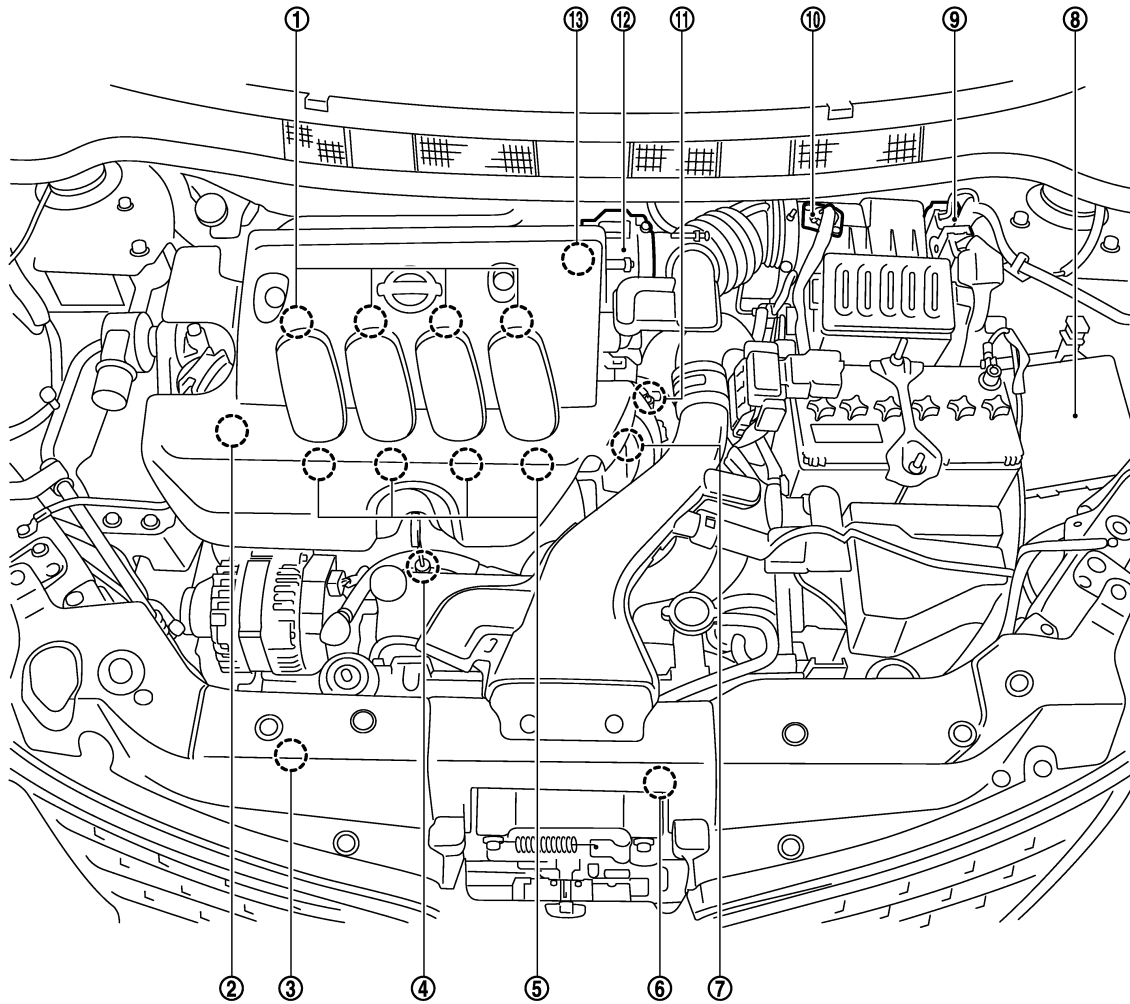
TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

Engine Control Component Parts Location

INFOID:000000005532416



PBIB3261E

- | | | |
|---|---|---|
| 1. Ignition coil (with power transistor) and spark plug | 2. Intake valve timing control solenoid valve | 3. Refrigerant pressure sensor |
| 4. Knock sensor | 5. Fuel injector | 6. Cooling fan motor |
| 7. Camshaft position sensor (PHASE) | 8. IPDM E/R | 9. ECM |
| 10. Mass air flow sensor (with intake air temperature sensor) | 11. Engine coolant temperature sensor | 12. Electric throttle control actuator (with built-in throttle position sensor, throttle control motor) |
| 13. EVAP canister purge volume control solenoid valve | | |

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

A

EC

C

D

E

F

G

H

I

J

K

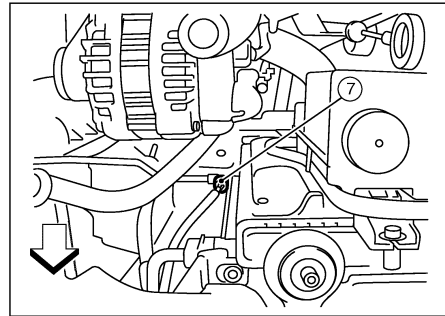
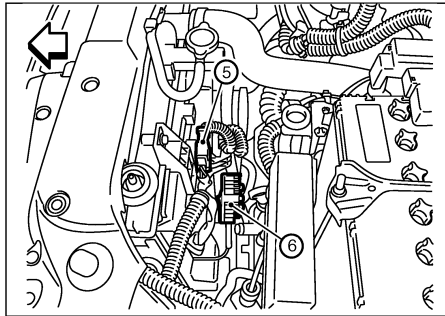
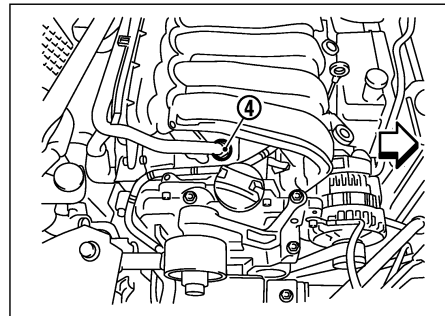
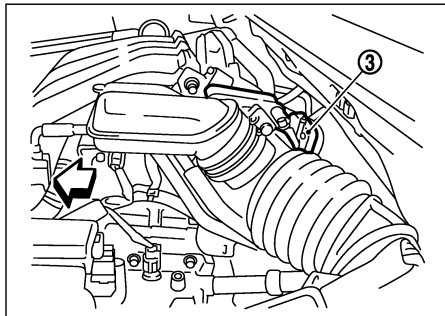
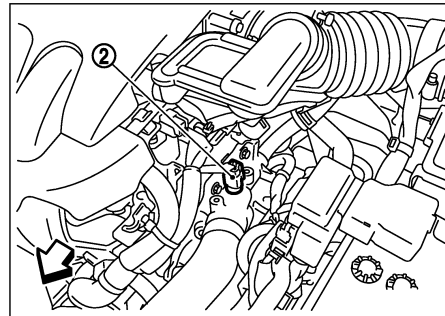
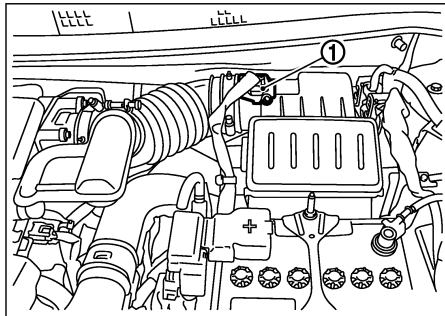
L

M

N

O

P



BBIA0724E

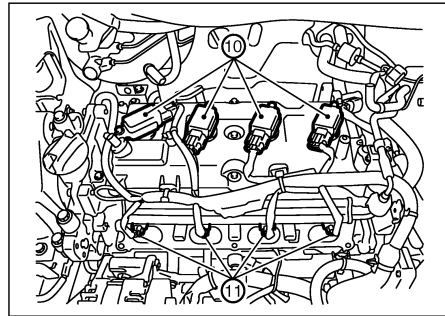
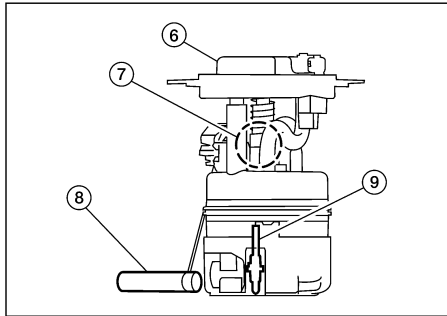
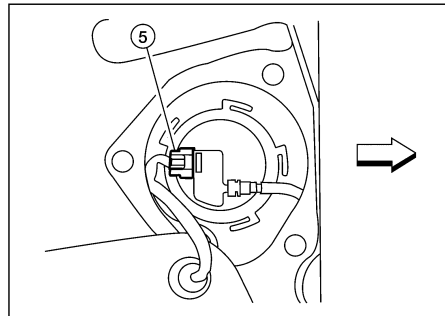
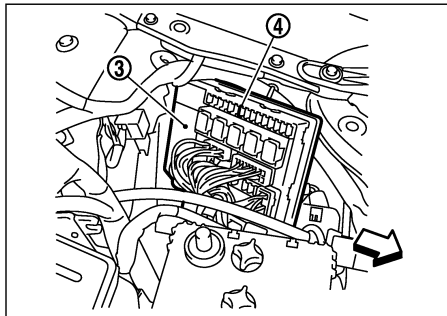
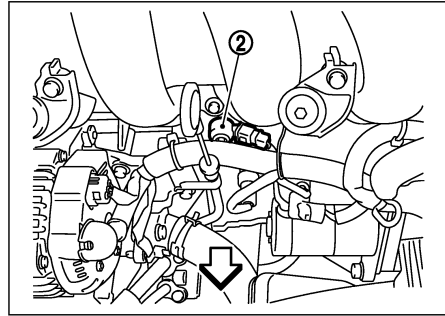
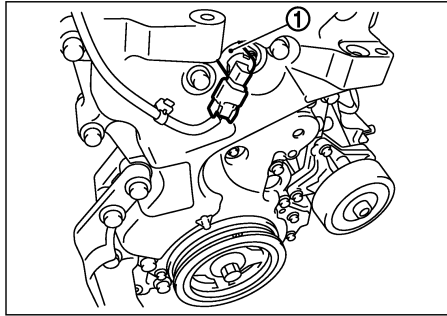
← : Vehicle front

- | | | |
|---|--------------------------------------|--|
| 1. Mass air flow sensor
(with intake air temperature sensor) | 2. Engine coolant temperature sensor | 3. Electric throttle control actuator
(with built in throttle position sensor,
throttle control motor) |
| 4. PCV valve | 5. Cooling fan motor | 6. Resistor |
| 7. Refrigerant pressure sensor | | |

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]



BBI/A0725E

← : Vehicle front

- | | | |
|--|---|---|
| 1. Intake valve timing control solenoid valve | 2. Knock sensor | 3. IPDM E/R |
| 4. Fuel pump fuse (15 A) | 5. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed) | 6. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed) |
| 7. Fuel pressure regulator | 8. Fuel level sensor | 9. Fuel tank temperature sensor |
| 10. Ignition coil (with power transistor) and spark plug | 11. Fuel injector | |

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

A

EC

C

D

E

F

G

H

I

J

K

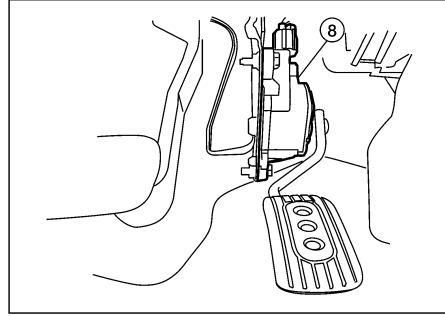
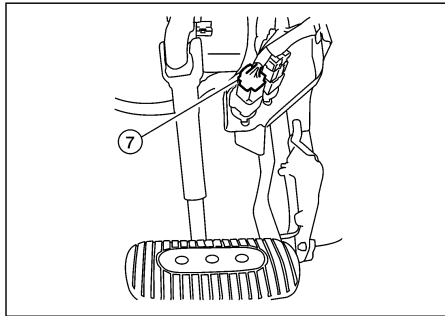
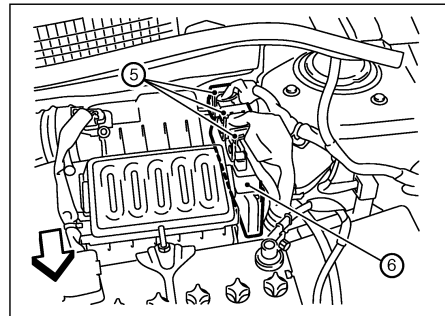
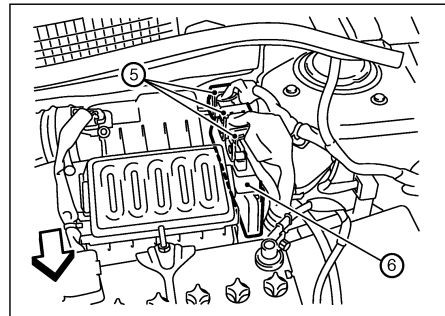
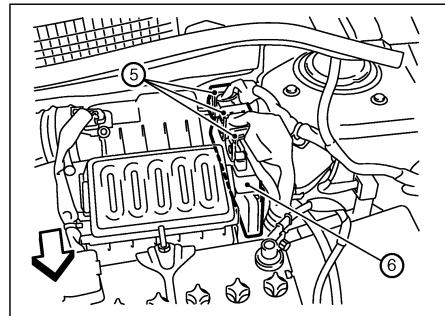
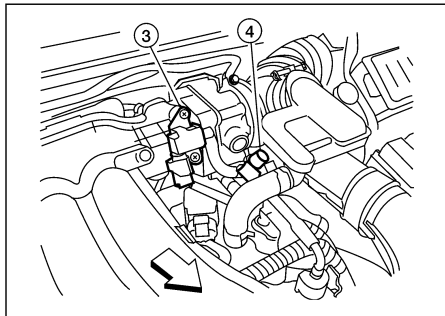
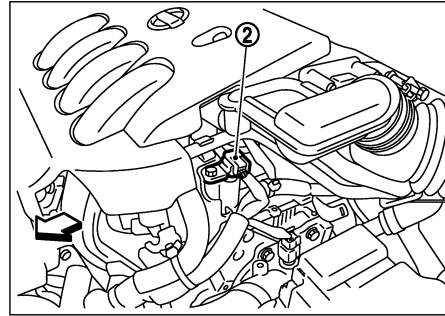
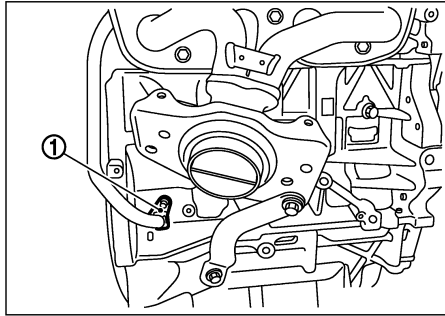
L

M

N

O

P



BBIA0727E

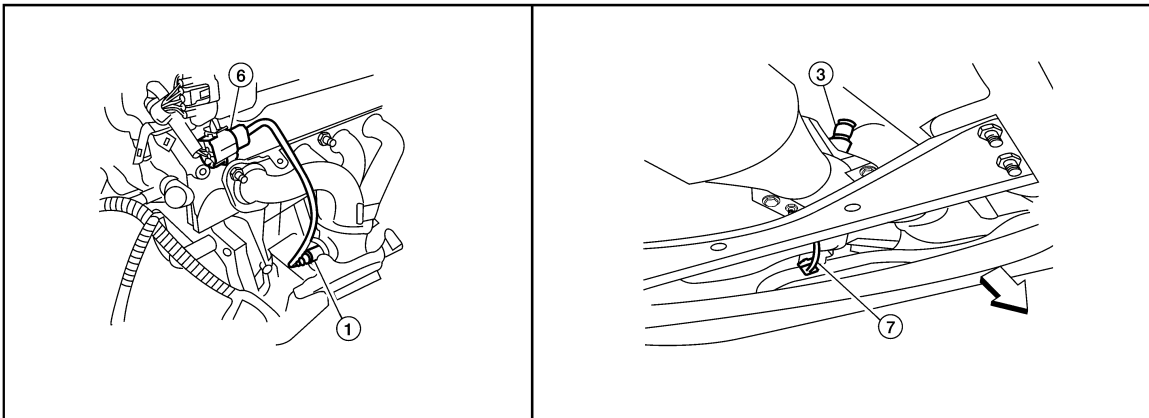
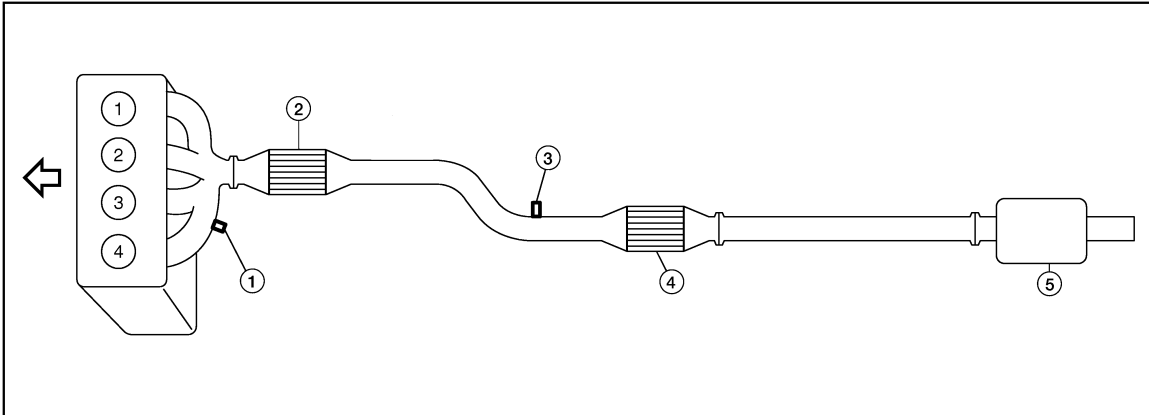
← Vehicle front

- | | | |
|-------------------------------------|--------------------------------------|--|
| 1. Crankshaft position sensor (POS) | 2. Camshaft position sensor (PHASE) | 3. EVAP canister purge volume control solenoid valve |
| 4. EVAP service port | 5. ECM harness connector | 6. ECM |
| 7. Stop lamp switch | 8. Accelerator pedal position sensor | |

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]



BBIA0726E

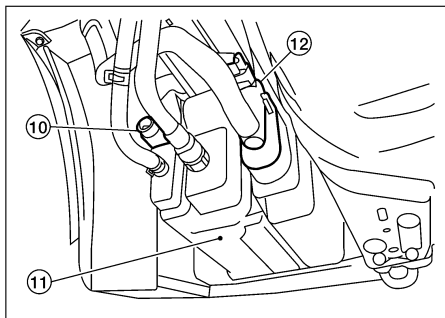
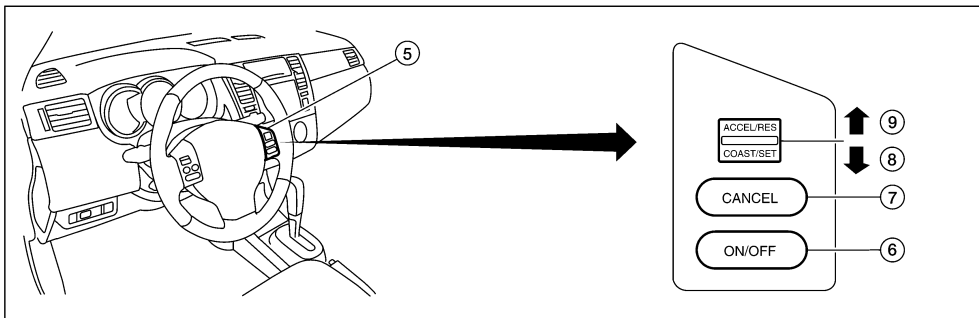
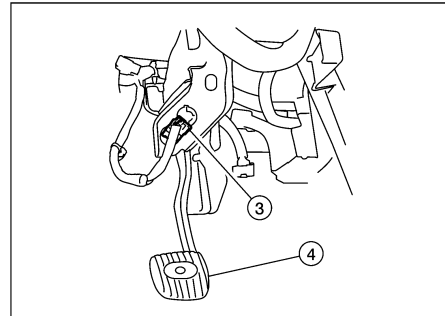
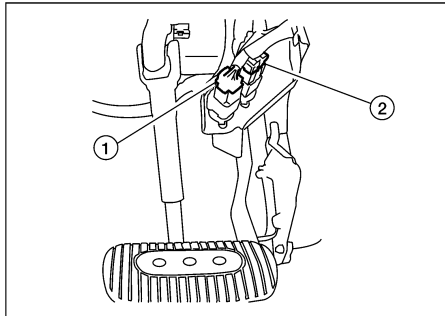
← : Vehicle front

- | | | |
|---|----------------------------------|--|
| 1. Air fuel ratio (A/F) sensor 1 | 2. Three way catalyst (Manifold) | 3. Heated oxygen sensor 2 |
| 4. Three way catalyst (Under floor) | 5. Muffler | 6. Air fuel ratio (A/F) sensor 1 harness connector |
| 7. Heated oxygen sensor 2 harness connector | | |

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]



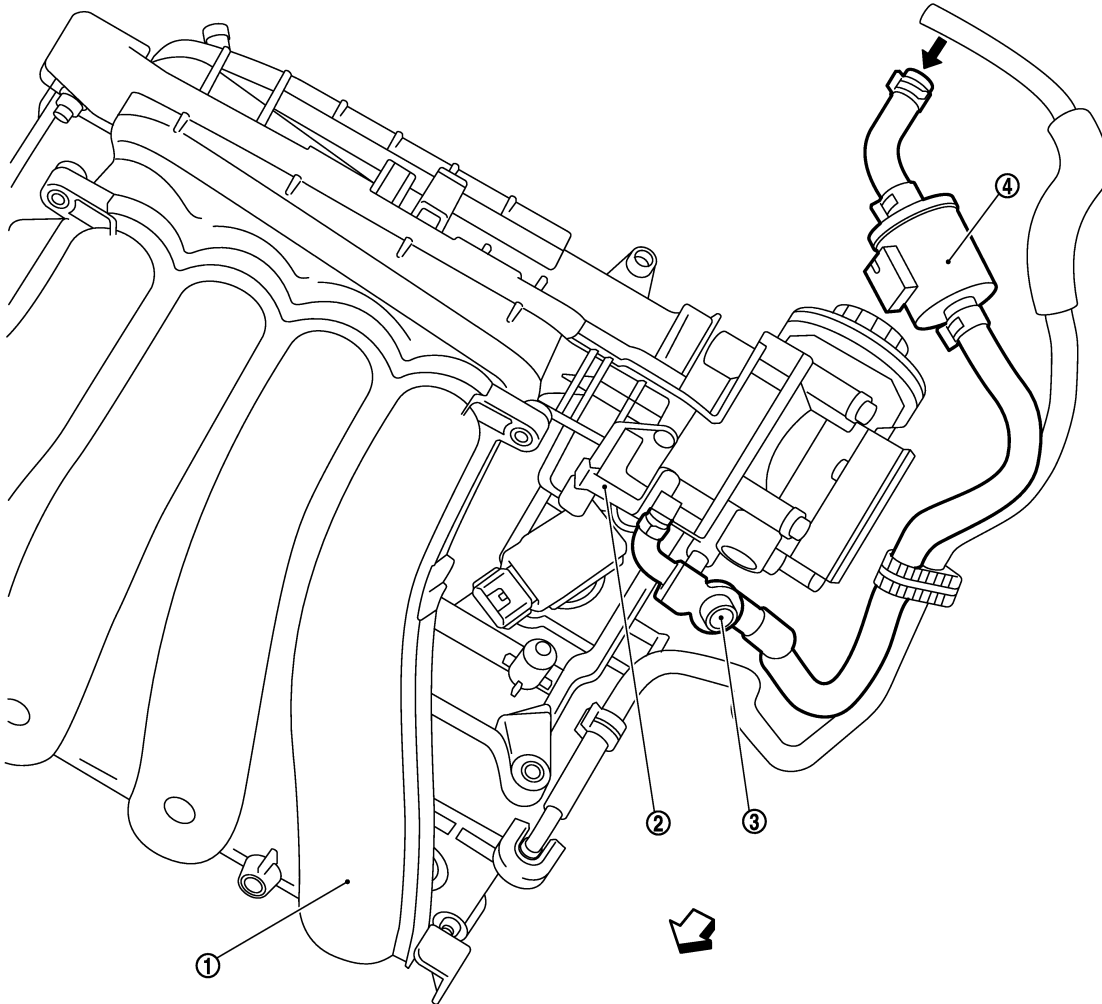
- | | | |
|---|-------------------------|--------------------------------------|
| 1. Stop lamp switch | 2. ASCD brake switch | 3. ASCD clutch switch |
| 4. Clutch pedal | 5. ASCD steering switch | 6. MAIN switch |
| 7. CANCEL switch | 8. SET/COAST switch | 9. RESUME/ACCELERATOR switch |
| 10. EVAP control system pressure sensor | 11. EVAP canister | 12. EVAP canister vent control valve |

BBIA0728E

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

Vacuum Hose Drawing

INFOID:000000005532417



PBIB3330E

⇨ : Vehicle front

⇦ : From EVAP canister

1. Intake manifold

2. EVAP canister purge volume control solenoid valve 3. EVAP service port solenoid valve

4. EVAP purge resonator

NOTE:

Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

Refer to [EC-516, "Schematic"](#) for Vacuum Control System.

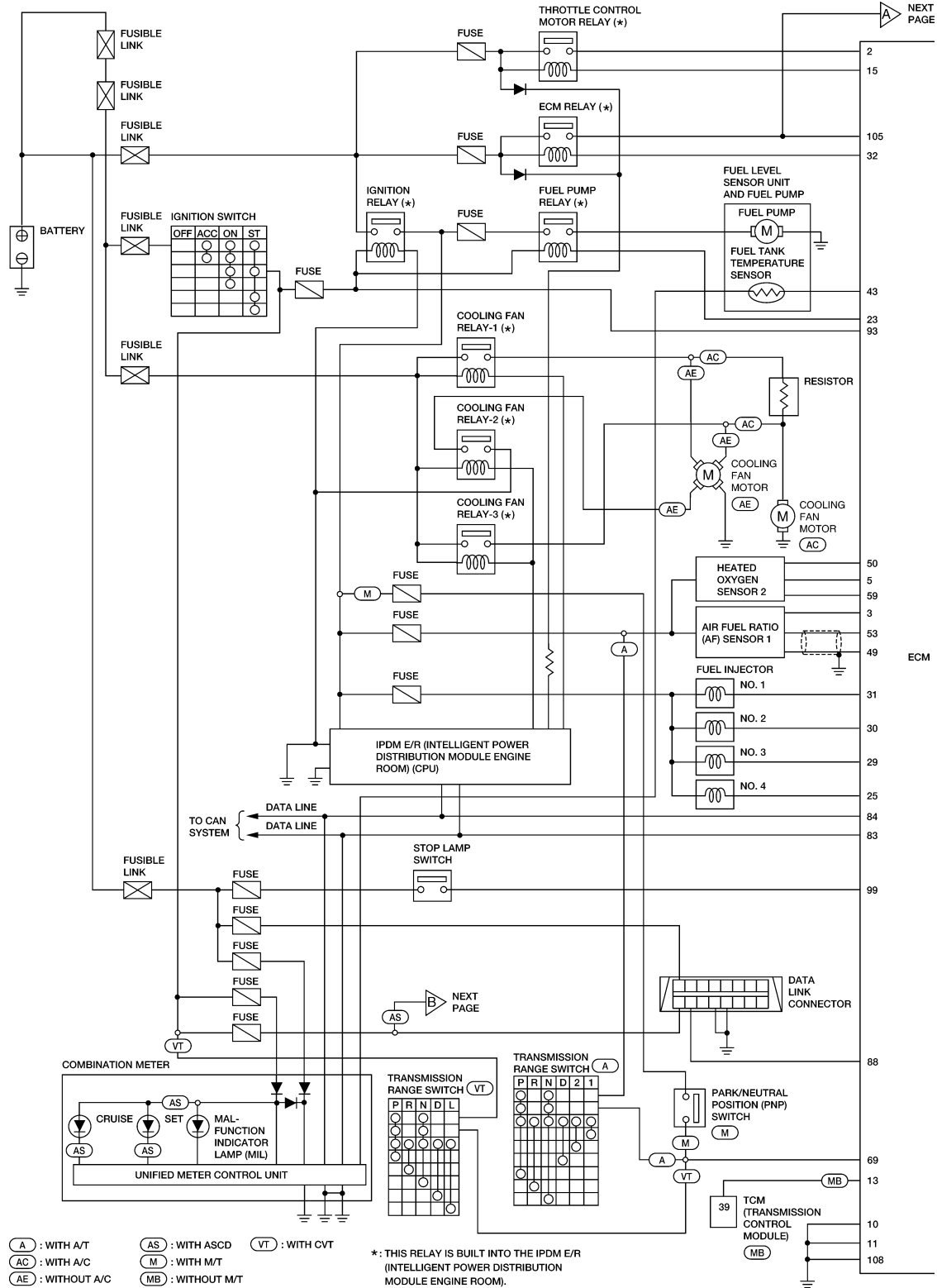
TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

INFOID:00000000532418

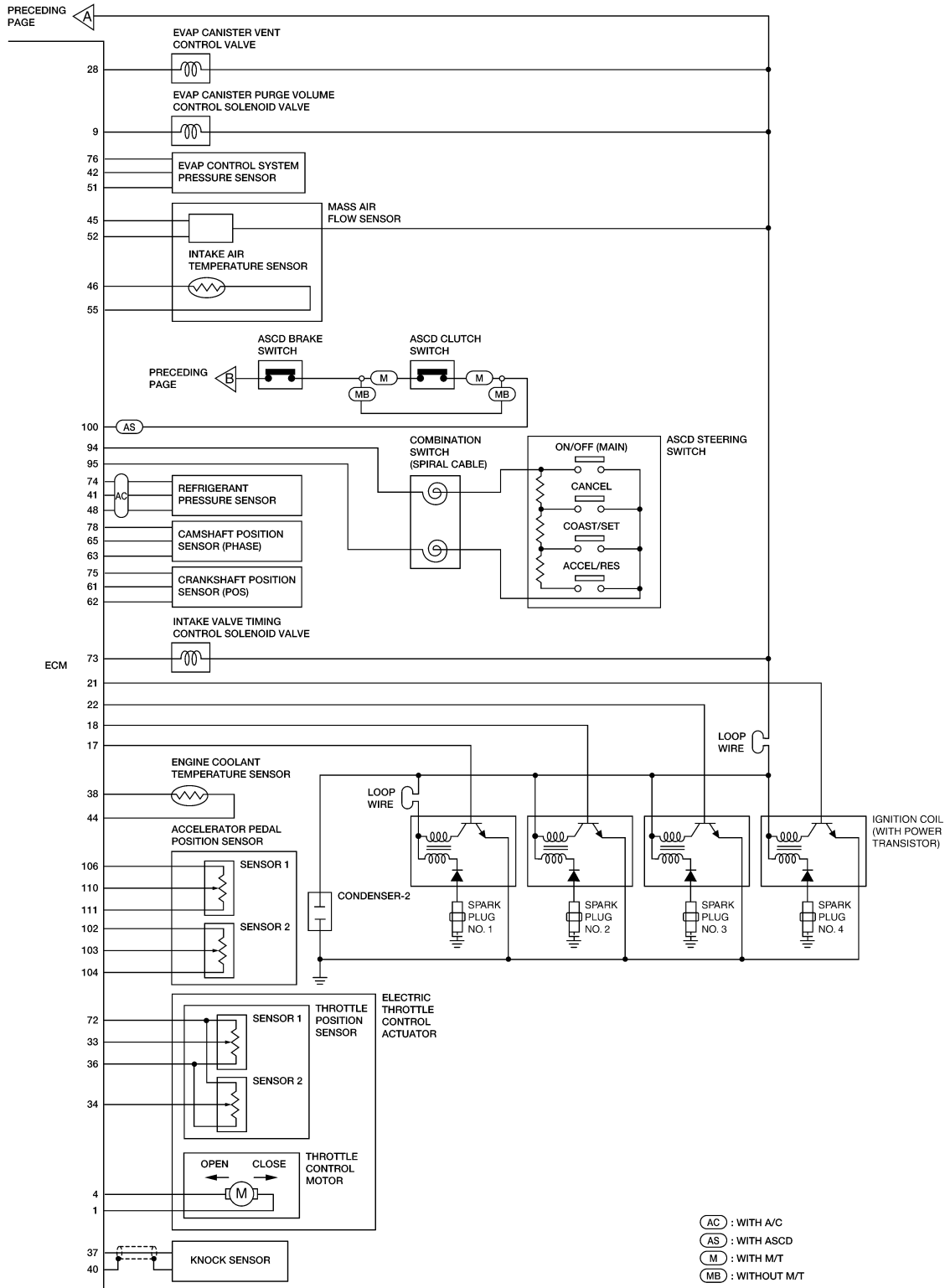
Circuit Diagram



TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]



AWBWA0033GB

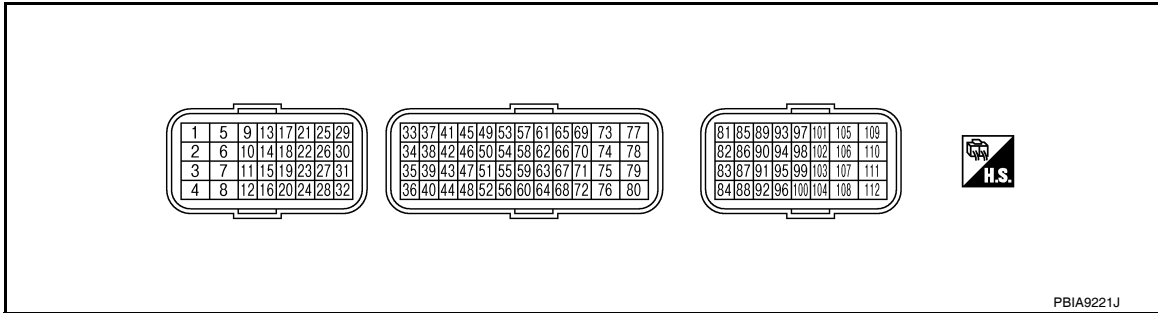
TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

ECM Harness Connector Terminal Layout

INFOID:000000005532419



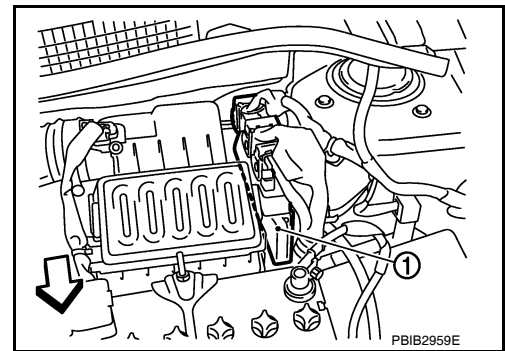
PBIA9221J

ECM Terminal and Reference Value

INFOID:000000005532420

PREPARATION

- ECM (1) is located in the engine room left side near battery.
 - ↔: Vehicle front



PBIB2959E

ECM INSPECTION TABLE

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

CAUTION:

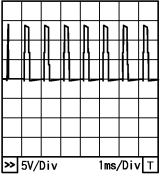
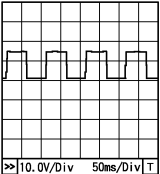
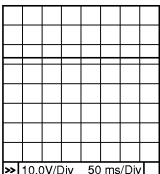
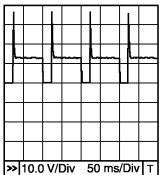
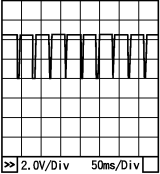
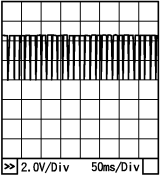
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

Terminal No.	Wire color	Item	Condition	Data (DC Voltage)
1	L	Throttle control motor (Open)	[Ignition switch: ON] <ul style="list-style-type: none"> Engine stopped Shift lever: D (A/T, CVT), 1st (M/T) Accelerator pedal: Fully depressed 	Approximately 3.2 V★ PBIA8150J
2	SB	Throttle control motor power supply	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
3	G	A/F sensor 1 heater	[Engine is running] <ul style="list-style-type: none"> Warm-up condition Idle speed (More than 140 seconds after starting engine) 	Approximately 2.9 - 8.8 V★ PBIA8148J

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

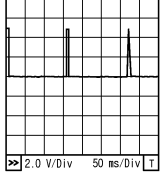
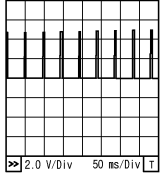
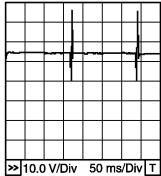
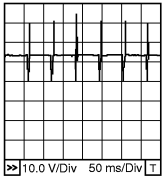
[MR18DE]

Terminal No.	Wire color	Item	Condition	Data (DC Voltage)
4	P	Throttle control motor (Close)	<p>[Ignition switch: ON]</p> <ul style="list-style-type: none"> • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released 	<p>Approximately 1.8 V★</p>  <p style="text-align: right; font-size: small;">PBIA8149J</p>
5	G	Heated oxygen sensor 2 heater	<p>[Engine is running]</p> <ul style="list-style-type: none"> • Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. 	<p>Approximately 10 V★</p>  <p style="text-align: right; font-size: small;">PBIA8148J</p>
			<p>[Ignition switch: ON]</p> <ul style="list-style-type: none"> • Engine stopped <p>[Engine is running]</p> <ul style="list-style-type: none"> • Engine speed: Above 3,600 rpm. 	<p>BATTERY VOLTAGE (11 - 14 V)</p>
9	P	EVAP canister purge volume control solenoid valve	<p>[Engine is running]</p> <ul style="list-style-type: none"> • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting. 	<p>BATTERY VOLTAGE (11 - 14 V)★</p>  <p style="text-align: right; font-size: small;">PBIB0050E</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine) 	<p>Approximately 10 V★</p>  <p style="text-align: right; font-size: small;">PBIB0520E</p>
10 11	B B	ECM ground	<p>[Engine is running]</p> <ul style="list-style-type: none"> • Idle speed 	<p>Body ground</p>
13	L	Tachometer signal	<p>[Engine is running]</p> <ul style="list-style-type: none"> • Warm-up condition • Idle speed <p>NOTE: The pulse cycle changes depending on rpm at idle.</p>	<p>3 - 5 V★</p>  <p style="text-align: right; font-size: small;">PBIA8164J</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> • Warm-up condition • Engine speed: 2,000 rpm. 	<p>3 - 5 V★</p>  <p style="text-align: right; font-size: small;">PBIA8165J</p>

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

Terminal No.	Wire color	Item	Condition	Data (DC Voltage)
15	Y	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
			[Ignition switch: ON]	0 - 1.0 V
17 18 21 22	R LG G SB	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 4 Ignition signal No. 3	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	0 - 0.3 V★  <small>PBIA9265J</small>
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm.	0.2 - 0.5 V★  <small>PBIA9266J</small>
23	GR	Fuel pump relay	[Ignition switch: ON] • For 1 second after turning ignition switch ON	0 - 1.0 V
			[Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)
25 29 30 31	V Y O L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14 V)★  <small>PBIB0529E</small>
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V)★  <small>PBIA4943J</small>
28	W	EVAP canister vent control valve	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
32	P	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.0 V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

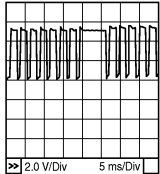
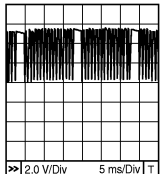
[MR18DE]

Terminal No.	Wire color	Item	Condition	Data (DC Voltage)
33	LG	Throttle position sensor 1	[Ignition switch: ON] <ul style="list-style-type: none"> • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released 	More than 0.36 V
			[Ignition switch: ON] <ul style="list-style-type: none"> • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed 	Less than 4.75 V
34	O	Throttle position sensor 2	[Ignition switch: ON] <ul style="list-style-type: none"> • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released 	Less than 4.75 V
			[Ignition switch: ON] <ul style="list-style-type: none"> • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed 	More than 0.36 V
36	Y	Sensor ground (Throttle position sensor)	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	Approximately 0 V
37	W	Knock sensor	[Engine is running] <ul style="list-style-type: none"> • Idle speed 	Approximately 2.5 V
38	P	Engine coolant temperature sensor	[Engine is running]	Approximately 0 - 4.8 V Output voltage varies with engine coolant temperature.
40	—	Sensor ground (Knock sensor)	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	Approximately 0 V
41	GR	Refrigerant pressure sensor	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Both A/C switch and blower fan switch: ON (Compressor operates.) 	1.0 - 4.0 V
42	V	EVAP control system pressure sensor	[Ignition switch: ON]	Approximately 1.8 - 4.8 V
43	P	Fuel tank temperature sensor	[Engine is running]	Approximately 0 - 4.8 V Output voltage varies with fuel tank temperature
44	B	Sensor ground (Engine coolant temperature sensor)	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	Approximately 0 V
45	G	Mass air flow sensor	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	0.9 - 1.2 V
			[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Engine speed: 2,500 rpm 	1.5 - 1.8 V
46	V	Intake air temperature sensor	[Engine is running]	Approximately 0 - 4.8 V Output voltage varies with intake air temperature.
48	BR	Sensor ground (Refrigerant pressure sensor)	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	Approximately 0 V
49	W	A/F sensor 1	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Engine speed: 2,000 rpm 	Approximately 1.8 V Output voltage varies with air fuel ratio.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]


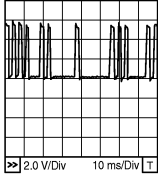
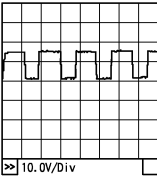
Terminal No.	Wire color	Item	Condition	Data (DC Voltage)
50	W	Heated oxygen sensor 2	[Engine is running] <ul style="list-style-type: none"> • Revving engine from idle to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. 	0 - Approximately 1.0 V
51	O	Sensor ground (EVAP control system pressure sensor)	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	Approximately 0 V
52	LG	Sensor ground (Mass air flow sensor)	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	Approximately 0 V
53	B	A/F sensor 1	[Ignition switch: ON]	Approximately 2.2 V
55	O	Sensor ground (Intake air temperature sensor)	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	Approximately 0 V
59	O	Sensor ground (Heated oxygen sensor 2)	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	Approximately 0 V
61	W	Crankshaft position sensor (POS)	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	Approximately 4.0 V★ 
			[Engine is running] <ul style="list-style-type: none"> • Engine speed: 2,000 rpm 	Approximately 4.0 V★ 
62	R	Sensor ground [Crankshaft position sensor (POS)]	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	Approximately 0 V
63	BR	Sensor ground [Camshaft position sensor (PHASE)]	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	Approximately 0 V

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

Terminal No.	Wire color	Item	Condition	Data (DC Voltage)
65	G	Camshaft position sensor (PHASE)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	1.0 - 2.0 V★  PBI2986E
			[Engine is running] • Engine speed: 2,000 rpm.	1.0 - 2.0 V★  PBI2987E
69	L	PNP signal	[Ignition switch: ON] • Shift lever: P or N (A/T, CVT), Neutral (M/T)	BATTERY VOLTAGE (11 - 14 V)
			[Ignition switch: ON] • Except above	Approximately 0 V
72	V	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5 V
73	P	Intake valve timing control solenoid valve	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
			[Engine is running] • Warm-up condition • When revving engine up to 2,000 rpm quickly	7 - 10 V★  PBI4937J
74	W	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	Approximately 5 V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	[Ignition switch: ON]	Approximately 5 V
76	W	EVAP control system pressure sensor power supply	[Ignition switch: ON]	Approximately 5 V
78	O	Sensor power supply [Camshaft position sensor (PHASE)]	[Ignition switch: ON]	Approximately 5 V
83	P	CAN communication line	—	—
84	L	CAN communication line	—	—
88	LG	DATA link connector	—	—
93	O	Ignition switch	[Ignition switch: OFF]	0 V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

Terminal No.	Wire color	Item	Condition	Data (DC Voltage)	A	
94	R	ASCD steering switch	[Ignition switch: ON] • ASCD steering switch: OFF	Approximately 4 V	EC	
			[Ignition switch: ON] • MAIN switch: Pressed	Approximately 0 V		
			[Ignition switch: ON] • CANCEL switch: Pressed	Approximately 1 V		C
			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	Approximately 3 V		
			[Ignition switch: ON] • SET/COAST switch: Pressed	Approximately 2 V		D
95	B	Sensor ground (ASCD steering switch)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V	E	
99	R	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0 V	F	
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)		
100	G	ASCD brake switch	[Ignition switch: ON] • Brake pedal: Slightly depressed (A/T, CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	Approximately 0 V	G	
			[Ignition switch: ON] • Brake pedal: Fully released (A/T, CVT) • Brake pedal and clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14 V)	H	
102	SB	Sensor power supply (Accelerator pedal position sensor 2)	[Ignition switch: ON]	Approximately 5 V	I	
103	GR	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6 V	J	
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4 V	K	
104	Y	Sensor ground (Accelerator pedal position sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V	L	
105	G	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	M	
106	P	Sensor power supply (Accelerator pedal position sensor 1)	[Ignition switch: ON]	Approximately 5 V	N	
108	B	ECM ground	[Engine is running] • Idle speed	Body ground	O	
110	G	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9 V	P	
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7 V		
111	R	Sensor ground (Accelerator pedal position sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V		

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

CONSULT-III Function (ENGINE)

INFOID:000000005532421

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-III unit.
Self Diagnostic Result	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data Monitor	Input/Output data in the ECM can be read.
Active Test	Diagnostic Test Mode in which CONSULT-III drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Function Test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
DTC & SRT Confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
ECU Identification	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

WORK SUPPORT MODE

Work Item

Work item	Condition	Usage
FUEL PRESSURE RELEASE	<ul style="list-style-type: none"> • FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. • CRANK A FEW TIMES AFTER ENGINE STALLS. 	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	<ul style="list-style-type: none"> • THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM. 	When learning the idle air volume
SELF-LEARNING CONT	<ul style="list-style-type: none"> • THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT. 	When clearing the coefficient of self-learning control value
EVAP SYSTEM CLOSE	<p>CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS.</p> <ul style="list-style-type: none"> • IGN SW "ON" • ENGINE NOT RUNNING • AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). • NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM • FUEL TANK TEMP. IS MORE THAN 0°C (32°F). • WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE" • WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITION EXCEPT ABOVE, CONSULT-III WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. <p>NOTE: WHEN STARTING ENGINE, CONSULT-III MAY DISPLAY "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", EVEN IN USING CHARGED BATTERY.</p>	When detecting EVAP vapor leak point of EVAP system
TARGET IDLE RPM ADJ*	<ul style="list-style-type: none"> • IDLE CONDITION 	When setting target idle speed

TROUBLE DIAGNOSIS

[MR18DE]

< SERVICE INFORMATION >

Work item	Condition	Usage
TARGET IGN TIM ADJ*	• IDLE CONDITION	When adjusting target ignition timing
VIN REGISTRATION	• IN THIS MODE, VIN IS REGISTERED IN ECM.	When registering VIN in ECM

*: This function is not necessary in the usual service procedure.

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to [EC-542. "Emission-related Diagnostic Information"](#).

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	• The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to EC-503)
FUEL SYS-B1	• "Fuel injection system status" at the moment a malfunction is detected is displayed. • One mode in the following is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enrichment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	• The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	• The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	• "Long-term fuel trim" at the moment a malfunction is detected is displayed. • The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRM-B1 [%]	• "Short-term fuel trim" at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	• The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	• The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH-P/S [%]	• The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [ms]	• The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	• The intake air temperature at the moment a malfunction is detected is displayed.
FUEL SYS-B2	• These items are displayed but are not applicable to this model.
L-FUEL TRM-B2 [%]	
S-FUEL TRM-B2 [%]	
INT MANI PRES [kPa]	
COMBUST CONDITION	

*: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE

Monitored Item

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

Monitored item [Unit]	Description	Remarks
ENG SPEED [rpm]	<ul style="list-style-type: none"> Indicates the engine speed computed from the signals of the crankshaft position sensor (POS) and camshaft position sensor (PHASE). 	<ul style="list-style-type: none"> Accuracy becomes poor if engine speed drops below the idle rpm. If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1 [V]	<ul style="list-style-type: none"> The signal voltage of the mass air flow sensor is displayed. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated. When engine is running, specification range is indicated in "SPEC".
B/FUEL SCHDL [ms]	<ul style="list-style-type: none"> "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 	<ul style="list-style-type: none"> When engine is running, specification range is indicated in "SPEC".
A/F ALPHA-B1 [%]	<ul style="list-style-type: none"> The mean value of the air-fuel ratio feedback correction factor per cycle is indicated. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated. This data also includes the data for the air/fuel ratio learning control. When engine is running, specification range is indicated in "SPEC".
COOLAN TEMP/S [°C] or [°F]	<ul style="list-style-type: none"> The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed. 	<ul style="list-style-type: none"> When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
A/F SEN1 (B1) [V]	<ul style="list-style-type: none"> The A/F signal computed from the input signal of the A/F sensor 1 is displayed. 	
HO2S2 (B1) [V]	<ul style="list-style-type: none"> The signal voltage of the heated oxygen sensor 2 is displayed. 	
HO2S2 MNTR(B1) [RICH/LEAN]	<ul style="list-style-type: none"> Display of heated oxygen sensor 2 signal: RICH: means the amount of oxygen after three way catalyst is relatively small. LEAN: means the amount of oxygen after three way catalyst is relatively large. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
VHCL SPEED SE [km/h] or [mph]	<ul style="list-style-type: none"> The vehicle speed computed from the vehicle speed signal is displayed. 	
BATTERY VOLT [V]	<ul style="list-style-type: none"> The power supply voltage of ECM is displayed. 	
ACCEL SEN 1 [V]	<ul style="list-style-type: none"> The accelerator pedal position sensor signal voltage is displayed. 	<ul style="list-style-type: none"> ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2 [V]		
TP SEN 1-B1 [V]	<ul style="list-style-type: none"> The throttle position sensor signal voltage is displayed. 	<ul style="list-style-type: none"> TP SEN 2-B1 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
TP SEN 2-B1 [V]		
FUEL T/TMP SE [°C] or [°F]	<ul style="list-style-type: none"> The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed. 	
INT/A TEMP SE [°C] or [°F]	<ul style="list-style-type: none"> The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated. 	
EVAP SYS PRES [V]	<ul style="list-style-type: none"> The signal voltage of EVAP control system pressure sensor is displayed. 	
FUEL LEVEL SE [V]	<ul style="list-style-type: none"> The signal voltage of the fuel level sensor is displayed. 	
START SIGNAL [ON/OFF]	<ul style="list-style-type: none"> Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage. 	<ul style="list-style-type: none"> After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS [ON/OFF]	<ul style="list-style-type: none"> Indicates idle position [ON/OFF] computed by the ECM according to the accelerator pedal position sensor signal. 	

TROUBLE DIAGNOSIS

[MR18DE]

< SERVICE INFORMATION >

Monitored item [Unit]	Description	Remarks	
AIR COND SIG [ON/OFF]	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal. 		A
P/N POSI SW [ON/OFF]	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the park/neutral position (PNP) signal. 		EC
PW/ST SIGNAL [ON/OFF]	<ul style="list-style-type: none"> [ON/OFF] condition of the power steering system (determined by the signal sent from EPS control unit) is indicated. 		C
LOAD SIGNAL [ON/OFF]	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF. 		D
IGNITION SW [ON/OFF]	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from ignition switch. 		E
HEATER FAN SW [ON/OFF]	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the heater fan switch signal. 		F
BRAKE SW [ON/OFF]	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the stop lamp switch signal. 		G
INJ PULSE-B1 [msec]	<ul style="list-style-type: none"> Indicates the actual fuel injection pulse width compensated by ECM according to the input signals. 	<ul style="list-style-type: none"> When the engine is stopped, a certain computed value is indicated. 	H
IGN TIMING [BTDC]	<ul style="list-style-type: none"> Indicates the ignition timing computed by ECM according to the input signals. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated. 	I
CAL/LD VALUE [%]	<ul style="list-style-type: none"> "Calculated load value" indicates the value of the current air flow divided by peak airflow. 		J
MASS AIRFLOW [g·m/s]	<ul style="list-style-type: none"> Indicates the mass airflow computed by ECM according to the signal voltage of the mass air flow sensor. 		K
PURG VOL C/V [%]	<ul style="list-style-type: none"> Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. The opening becomes larger as the value increases. 		L
INT/V TIM(B1) [°CA]	<ul style="list-style-type: none"> Indicates [°CA] of intake camshaft advanced angle. 		M
INT/V SOL(B1) [%]	<ul style="list-style-type: none"> The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signal) is indicated. The advance angle becomes larger as the value increases 		N
AIR COND RLY [ON/OFF]	<ul style="list-style-type: none"> The air conditioner relay control condition (determined by ECM according to the input signals) is indicated. 		O
FUEL PUMP RLY [ON/OFF]	<ul style="list-style-type: none"> Indicates the fuel pump relay control condition determined by ECM according to the input signals. 		P
VENT CONT/V [ON/OFF]	<ul style="list-style-type: none"> The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. ON: Closed OFF: Open 		P
THRTL RELAY [ON/OFF]	<ul style="list-style-type: none"> Indicates the throttle control motor relay control condition determined by the ECM according to the input signals. 		P
COOLING FAN [HI/LOW/OFF]	<ul style="list-style-type: none"> Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI: High speed operation LOW: Low speed operation OFF: Stop 		P
HO2S2 HTR (B1) [ON/OFF]	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals. 		
I/P PULLY SPD [rpm]	<ul style="list-style-type: none"> Indicates the engine speed computed from the input speed sensor signal. 		

TROUBLE DIAGNOSIS

[MR18DE]

< SERVICE INFORMATION >

Monitored item [Unit]	Description	Remarks
VEHICLE SPEED [km/h] or [MPH]	<ul style="list-style-type: none"> The vehicle speed computed from the vehicle speed signal sent from TCM is displayed. 	
IDL A/V LEARN [YET/CMPLT]	<ul style="list-style-type: none"> Display the condition of idle air volume learning YET: Idle Air Volume Learning has not been performed yet. CMPLT: Idle Air Volume Learning has already been performed successfully. 	
TRVL AFTER MIL [km] or [mile]	<ul style="list-style-type: none"> Distance traveled while MIL is activated. 	
A/F S1 HTR(B1) [%]	<ul style="list-style-type: none"> Indicates A/F sensor 1 heater control value computed by ECM according to the input signals. The current flow to the heater becomes larger as the value increases. 	
AC PRESS SEN [V]	<ul style="list-style-type: none"> The signal voltage from the refrigerant pressure sensor is displayed. 	
VHCL SPEED SE [km/h] or [MPH]	<ul style="list-style-type: none"> The vehicle speed computed from the vehicle speed signal sent from TCM is displayed. 	
SET VHCL SPD [km/h] or [MPH]	<ul style="list-style-type: none"> The preset vehicle speed is displayed. 	
MAIN SW [ON/OFF]	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from MAIN switch signal. 	
CANCEL SW [ON/OFF]	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from CANCEL switch signal. 	
RESUME/ACC SW [ON/OFF]	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal. 	
SET SW [ON/OFF]	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from SET/COAST switch signal. 	
BRAKE SW1 [ON/OFF]	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from ASCD brake switch signal. 	
BRAKE SW2 [ON/OFF]	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of stop lamp switch signal. 	
VHCL SPD CUT [NON/CUT]	<ul style="list-style-type: none"> Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed increased to excessively high compared with the ASCD set speed, and ASCD operation is cut off. 	
LO SPEED CUT [NON/CUT]	<ul style="list-style-type: none"> Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off. 	
AT OD MONITOR [ON/OFF]	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of A/T O/D according to the input signal from the TCM. 	<ul style="list-style-type: none"> For M/T models always "OFF" is displayed
AT OD CANCEL [ON/OFF]	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of A/T O/D cancel signal sent from the TCM. 	<ul style="list-style-type: none"> For M/T models always "OFF" is displayed
CRUISE LAMP [ON/OFF]	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals. 	
SET LAMP [ON/OFF]	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals. 	
A/F ADJ-B1	<ul style="list-style-type: none"> Indicates the correction factor stored in ECM. The factor is calculated from the difference between the target air/fuel ratio stored in ECM and the air/fuel ratio calculated from air fuel ratio (A/F) sensor 1 signal. 	
HO2 S2 DIAG1 (B1) [INCMP/CMPLT]	<ul style="list-style-type: none"> Indicates DTC P0139 self-diagnosis (delayed response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

Monitored item [Unit]	Description	Remarks
HO2 S2 DIAG2 (B1) [INCMP/CMPLT]	<ul style="list-style-type: none"> Indicates DTC P0139 self-diagnosis (slow response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
A/F SEN1 DIAG1(B1) [INCMP/CMPLT]	<ul style="list-style-type: none"> Indicates DTC P015A or P015B self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
A/F SEN1 DIAG2(B1) [INCMP/CMPLT]	<ul style="list-style-type: none"> Indicates DTC P014C or P014D self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
A/F SEN1 DIAG3(B1) [ABSNT/PRSNT]	<ul style="list-style-type: none"> Indicates DTC P014C, P014D, P015A or P015B self-diagnosis condition. ABSNT: The vehicle condition is not within the diagnosis range. PRSNT: The vehicle condition is within the diagnosis range. 	

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

Test Item

Test item	Condition	Judgment	Check item (Remedy)
FUEL INJECTION	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the amount of fuel injection using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connectors Fuel injector Air fuel ratio (A/F) sensor 1
IGNITION TIMING	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Timing light: Set Retard the ignition timing using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Perform Idle Air Volume Learning.
POWER BALANCE	<ul style="list-style-type: none"> Engine: After warming up, idle the engine. A/C switch OFF Shift lever: P or N (A/T, CVT), Neutral (M/T) Cut off each fuel injector signal one at a time using CONSULT-III. 	Engine runs rough or dies.	<ul style="list-style-type: none"> Harness and connectors Compression Fuel injector Power transistor Spark plug Ignition coil
COOLING FAN*	<ul style="list-style-type: none"> Ignition switch: ON Turn the cooling fan "LOW", "HI" and "OFF" with CONSULT-III. 	Cooling fan moves and stops.	<ul style="list-style-type: none"> Harness and connectors Cooling fan relay Cooling fan motor
ENG COOLANT TEMP	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the engine coolant temperature using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connectors Engine coolant temperature sensor Fuel injector
FUEL PUMP RELAY	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Turn the fuel pump relay ON and OFF using CONSULT-III and listen to operating sound. 	Fuel pump relay makes the operating sound.	<ul style="list-style-type: none"> Harness and connectors Fuel pump relay
PURG VOL CONT/V	<ul style="list-style-type: none"> Engine: After warming up, run engine at 1,500 rpm. Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-III. 	Engine speed changes according to the opening percent.	<ul style="list-style-type: none"> Harness and connectors EVAP canister purge volume control solenoid valve
FUEL/T TEMP SEN	<ul style="list-style-type: none"> Change the fuel tank temperature using CONSULT-III. 		

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

Test item	Condition	Judgment	Check item (Remedy)
VENT CONTROL/V	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Turn solenoid valve "ON" and "OFF" with the CONSULT-III and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> Harness and connectors EVAP canister vent control valve
V/T ASSIGN ANGLE	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change intake valve timing using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connectors Intake valve timing control solenoid valve

*: Leaving cooling fan OFF with CONSULT-III while engine is running may cause the engine to overheat.

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to [EC-542, "Emission-related Diagnostic Information"](#).

PERMANENT DTC STATUS Mode

For details, refer to [EC-542, "Emission-related Diagnostic Information"](#).

NOTE:

This mode is not used in regions that permanent DTCs are not regulated by law.

SRT WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

PERMANENT DTC WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to complete the driving pattern that is required for erasing permanent DTC.

NOTE:

This mode is not used in regions that permanent DTCs are not regulated by law.

DTC WORK SUPPORT Mode

Test mode	Test item	Corresponding DTC No.	Reference
EVAPORATIVE SYSTEM	PURG FLOW P0441	P0441	EC-810
	EVP SML LEAK P0442/P1442*	P0442	EC-815
		P0455	EC-866
	EVP V/S LEAK P0456/P1456*	P0456	EC-873
	PURG VOL CN/V P1444	P0443	EC-822
A/F SEN1	A/F SEN1 (B1) P1276	P0130	EC-704
	A/F SEN1 (B1) P1278/P1279	—	—
HO2S2	HO2S2 (B1) P0139	P0139	EC-741
	HO2S2 (B1) P1146	P0138	EC-731
	HO2S2 (B1) P1147	P0137	EC-722

*: DTC P1442 and P1456 does not apply to C11 models but appears in DTC Work Support Mode screens.

Generic Scan Tool (GST) Function

INFOID:000000005532422

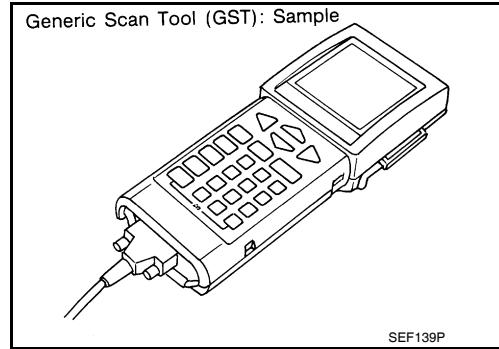
DESCRIPTION

TROUBLE DIAGNOSIS

[MR18DE]

< SERVICE INFORMATION >

Generic Scan Tool (OBDII scan tool) complying with SAE J1978/ISO 15031-4 has 8 different functions explained below. ISO 15765-4 is used as the protocol. The name GST or Generic Scan Tool is used in this service manual.



FUNCTION

Diagnostic test mode		Function
Service \$01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
Service \$02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-612, "CONSULT-III Function (ENGINE)" .
Service \$03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.
Service \$04	CLEAR DIAG INFO	This diagnostic service can clear all emission-related diagnostic information. This includes: <ul style="list-style-type: none"> • Clear number of diagnostic trouble codes (Service \$01) • Clear diagnostic trouble codes (Service \$03) • Clear trouble code for freeze frame data (Service \$01) • Clear freeze frame data (Service \$02) • Reset status of system monitoring test (Service \$01) • Clear on board monitoring test results (Service \$06 and \$07)
Service \$06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
Service \$07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
Service \$08	—	This diagnostic service can close EVAP system in ignition switch ON position (Engine stopped). When this diagnostic service is performed, EVAP canister vent control valve can be closed. In the following conditions, this diagnostic service cannot function. <ul style="list-style-type: none"> • Low ambient temperature • Low battery voltage • Engine running • Ignition switch OFF • Low fuel temperature • Too much pressure is applied to EVAP system
Service \$09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.
Service \$0A*	PERMANENT DTCs	This diagnostic service gains access to permanent DTCs which were stored by ECM.

NOTE:

*: Service \$0A is not applied for regions where it is not mandated.

INSPECTION PROCEDURE

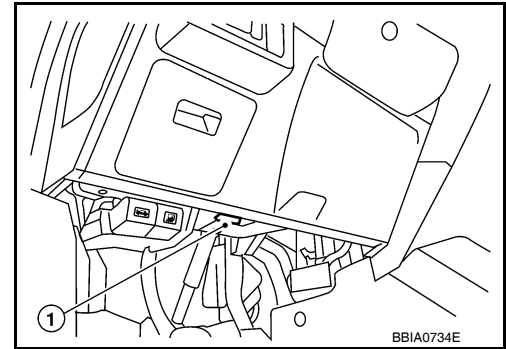
1. Turn ignition switch OFF.

TROUBLE DIAGNOSIS

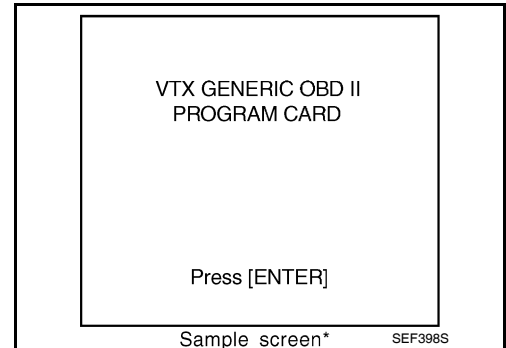
[MR18DE]

< SERVICE INFORMATION >

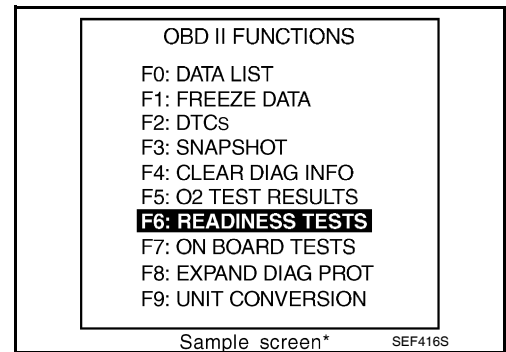
- Connect GST to data link connector (1), which is located under LH dash panel.



- Turn ignition switch ON.
- Enter the program according to instruction on the screen or in the operation manual.
(*: Regarding GST screens in this section, sample screens are shown.)



- Perform each diagnostic service according to each service procedure.
For further information, see the GST Operation Manual of the tool maker.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532423

Remarks:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.

* Specification data may not be directly related to their components signals/values/operations.

i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

Monitor item	Condition	Specification
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.	Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-624 .	
B/FUEL SCHDL	See EC-624 .	
A/F ALPHA-B1	See EC-624 .	
COOLAN TEMP/S	• Engine: After warming up	More than 70°C (158°F)
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm
		Fluctuates around 2.2 V

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

Monitor item	Condition	Specification		
HO2S2 (B1)	<ul style="list-style-type: none"> • Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	0 - 0.3 V ↔ Approx. 0.6 - 1.0 V	A	
HO2S2 MNTR (B1)		LEAN ↔ RICH	EC	
VHCL SPEED SE	<ul style="list-style-type: none"> • Turn drive wheels and compare CONSULT-III value with the speedometer indication. 	Almost the same speed as the speedometer indication.	C	
BATTERY VOLT	<ul style="list-style-type: none"> • Ignition switch: ON (Engine stopped) 	11 - 14 V		
ACCEL SEN 1	<ul style="list-style-type: none"> • Ignition switch: ON (Engine stopped) 	Accelerator pedal: Fully released	0.6 - 0.9 V	D
		Accelerator pedal: Fully depressed	4.0 - 4.8 V	
ACCEL SEN 2*	<ul style="list-style-type: none"> • Ignition switch: ON (Engine stopped) 	Accelerator pedal: Fully released	0.6 - 0.9 V	E
		Accelerator pedal: Fully depressed	3.9 - 4.8 V	
EVAP SYS PRES	<ul style="list-style-type: none"> • Ignition switch: ON 	Approx. 1.8 - 4.8 V		
TP SEN 1-B1 TP SEN 2-B1*	<ul style="list-style-type: none"> • Ignition switch: ON (Engine stopped) • Shift lever: D (A/T, CVT), 1st (M/T) 	Accelerator pedal: Fully released	More than 0.36 V	F
		Accelerator pedal: Fully depressed	Less than 4.75 V	
START SIGNAL	<ul style="list-style-type: none"> • Ignition switch: ON → START → ON 	OFF → ON → OFF	G	
CLSD THL POS	<ul style="list-style-type: none"> • Ignition switch: ON 	Accelerator pedal: Fully released	ON	H
		Accelerator pedal: Slightly depressed	OFF	
AIR COND SIG	<ul style="list-style-type: none"> • Engine: After warming up, idle the engine 	Air conditioner switch: OFF	OFF	I
		Air conditioner switch: ON (Compressor operates.)	ON	
P/N POSI SW	<ul style="list-style-type: none"> • Ignition switch: ON 	Shift lever: P or N (A/T, CVT), Neutral (M/T)	ON	J
		Shift lever: Except above	OFF	
PW/ST SIGNAL	<ul style="list-style-type: none"> • Engine: After warming up, idle the engine 	Steering wheel: Not being turned	OFF	K
		Steering wheel: Being turned	ON	
LOAD SIGNAL	<ul style="list-style-type: none"> • Ignition switch: ON 	Rear window defogger switch: ON and/or Lighting switch: 2nd	ON	L
		Rear window defogger switch and lighting switch: OFF	OFF	
IGNITION SW	<ul style="list-style-type: none"> • Ignition switch: ON → OFF → ON 	ON → OFF → ON		
HEATER FAN SW	<ul style="list-style-type: none"> • Ignition switch: ON 	Heater fan: Operating	ON	M
		Heater fan: Not operating	OFF	
BRAKE SW	<ul style="list-style-type: none"> • Ignition switch: ON 	Brake pedal: Fully released	OFF	N
		Brake pedal: Slightly depressed	ON	
INJ PULSE-B1	<ul style="list-style-type: none"> • Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load 	Idle	2.0 - 3.0 msec	O
		2,000 rpm	1.9 - 2.9 msec	
IGN TIMING	<ul style="list-style-type: none"> • Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load 	Idle	8° - 18° BTDC	P
		2,000 rpm	25° - 45° BTDC	
CAL/LD VALUE	<ul style="list-style-type: none"> • Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load 	Idle	10% - 35%	
		2,500 rpm	10% - 35%	

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

Monitor item	Condition		Specification
MASS AIRFLOW	<ul style="list-style-type: none"> Engine: After warming up Air conditioner switch: OFF Shift lever: P or N (A/T, CVT), Neutral (M/T) No load 	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	2.0 - 10.0 g·m/s
PURG VOL C/V	<ul style="list-style-type: none"> Engine: After warming up Air conditioner switch: OFF Shift lever: P or N (A/T, CVT), Neutral (M/T) No load 	Idle (Accelerator pedal is not depressed even slightly, after engine starting)	0%
		2,000 rpm	0 - 50%
INT/V TIM (B1)	<ul style="list-style-type: none"> Engine: After warming up Air conditioner switch: OFF Shift lever: P or N (A/T, CVT), Neutral (M/T) No load 	Idle	-5° - 5°C
		When revving engine up to 2,000 rpm quickly	Approx. 0° - 40°C
INT/V SOL (B1)	<ul style="list-style-type: none"> Engine: After warming up Air conditioner switch: OFF Shift lever: P or N (A/T, CVT), Neutral (M/T) No load 	Idle	0% - 2%
		When revving engine up to 2,000 rpm quickly	Approx. 0% - 90%
AIR COND RLY	<ul style="list-style-type: none"> Engine: After warming up, idle the engine 	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	<ul style="list-style-type: none"> For 1 second after turning ignition switch ON Engine running or cranking Except above conditions 		ON
			OFF
VENT CONT/V	<ul style="list-style-type: none"> Ignition switch: ON 		OFF
THRTL RELAY	<ul style="list-style-type: none"> Ignition switch: ON 		ON
COOLING FAN	<ul style="list-style-type: none"> Engine: After warming up, idle the engine Air conditioner switch: OFF 	Engine coolant temperature: 97°C (207°F) or less	OFF
		Engine coolant temperature: Between 98°C (208°F) and 99°C (210°F)	LOW
		Engine coolant temperature: 100°C (212°F) or more	HIGH
HO2S2 HTR (B1)	<ul style="list-style-type: none"> Below 3,600 rpm after the following conditions are met. <ul style="list-style-type: none"> Engine: After warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load Engine speed: Above 3,600 rpm 		ON
			OFF
I/P PULLY SPD	<ul style="list-style-type: none"> Vehicle speed: More than 20 km/h (12 MPH) 		Almost the same speed as the tachometer indication
VEHICLE SPEED	<ul style="list-style-type: none"> Turn drive wheels and compare CONSULT-III value with the speedometer indication. 		Almost the same speed as the speedometer indication
TRVL AFTER MIL	<ul style="list-style-type: none"> Ignition switch: ON 	Vehicle has traveled after MIL has turned ON.	0 - 65,535 km (0 - 40,723 mile)
A/F S1 HTR (B1)	<ul style="list-style-type: none"> Engine: After warming up, idle the engine (More than 140 seconds after starting engine.) 		4 - 100%
AC PRESS SEN	<ul style="list-style-type: none"> Engine: Idle Air conditioner switch: ON (Compressor operates) 		1.0 - 4.0 V
VHCL SPEED SE	<ul style="list-style-type: none"> Turn drive wheels and compare speedometer indication with the CONSULT-III value. 		Almost the same speed as the speedometer indication
SET VHCL SPD	<ul style="list-style-type: none"> Engine: Running 	ASCD: Operating	The preset vehicle speed is displayed.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[MR18DE]

Monitor item	Condition	Specification	
MAIN SW	• Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	• Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	• Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	• Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
BRAKE SW1	• Ignition switch: ON	• Brake pedal: Fully released (A/T, CVT) • Brake pedal and clutch pedal: Fully released (M/T)	ON
		• Brake pedal: Slightly depressed (A/T, CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	OFF
BRAKE SW2	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
CRUISE LAMP	• Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • Vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ACSD: Operating	ON
		ASCD: Not operating	OFF
HO2 S2 DIAG1 (B1)	DTC P0139 self-diagnosis (delayed response) is incomplete.		INCMP
	DTC P0139 self-diagnosis (delayed response) is complete.		CMPLT
HO2 S2 DIAG2 (B1)	DTC P0139 self-diagnosis (slow response) is incomplete.		INCMP
	DTC P0139 self-diagnosis (slow response) is complete.		CMPLT
A/F SEN1 DIAG1 (B1)	DTC P015A and P015B self-diagnosis is incomplete.		INCMP
	DTC P015A and P015B self-diagnosis is complete.		CMPLT
A/F SEN1 DIAG2 (B1)	DTC P014C and P014D self-diagnosis is incomplete.		INCMP
	DTC P014C and P014D self-diagnosis is complete.		CMPLT
A/F SEN1 DIAG3 (B1)	The vehicle condition is not within the diagnosis range of DTC P014C, P014D, P015A or P015B.		ABSNT
	The vehicle condition is within the diagnosis range of DTC P014C, P014D, P015A or P015B.		PRSNT

*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

[MR18DE]

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:000000005532424

The specification (SP) value indicates the tolerance of the value that is displayed in "SPEC" of "DATA MONITOR" mode of CONSULT-III during normal operation of the Engine Control System. When the value in "SPEC" of "DATA MONITOR" mode is within the SP value, the Engine Control System is confirmed OK. When the value in "SPEC" of "DATA MONITOR" mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.

The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.

The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

INFOID:000000005532425

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm², 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up
- A/T and CVT models: After the engine is warmed up to normal operating temperature, drive vehicle until "FLUID TEMP SE" (A/T or CVT) fluid temperature sensor signal) indicates more than 60°C (140°F).
- M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied
- Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.
- Engine speed: Idle

Inspection Procedure

INFOID:000000005532426

NOTE:

Perform "SPEC" of "DATA MONITOR" mode in maximum scale display.

1. Perform [EC-574, "Basic Inspection"](#).
2. Confirm that the testing conditions indicated above are met.
3. Select "B/FUEL SCHDL", "A/F ALPHA-B1" and "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode with CONSULT-III.
4. Make sure that monitor items are within the SP value.
5. If NG, go to [EC-624, "Diagnosis Procedure"](#).

Diagnosis Procedure

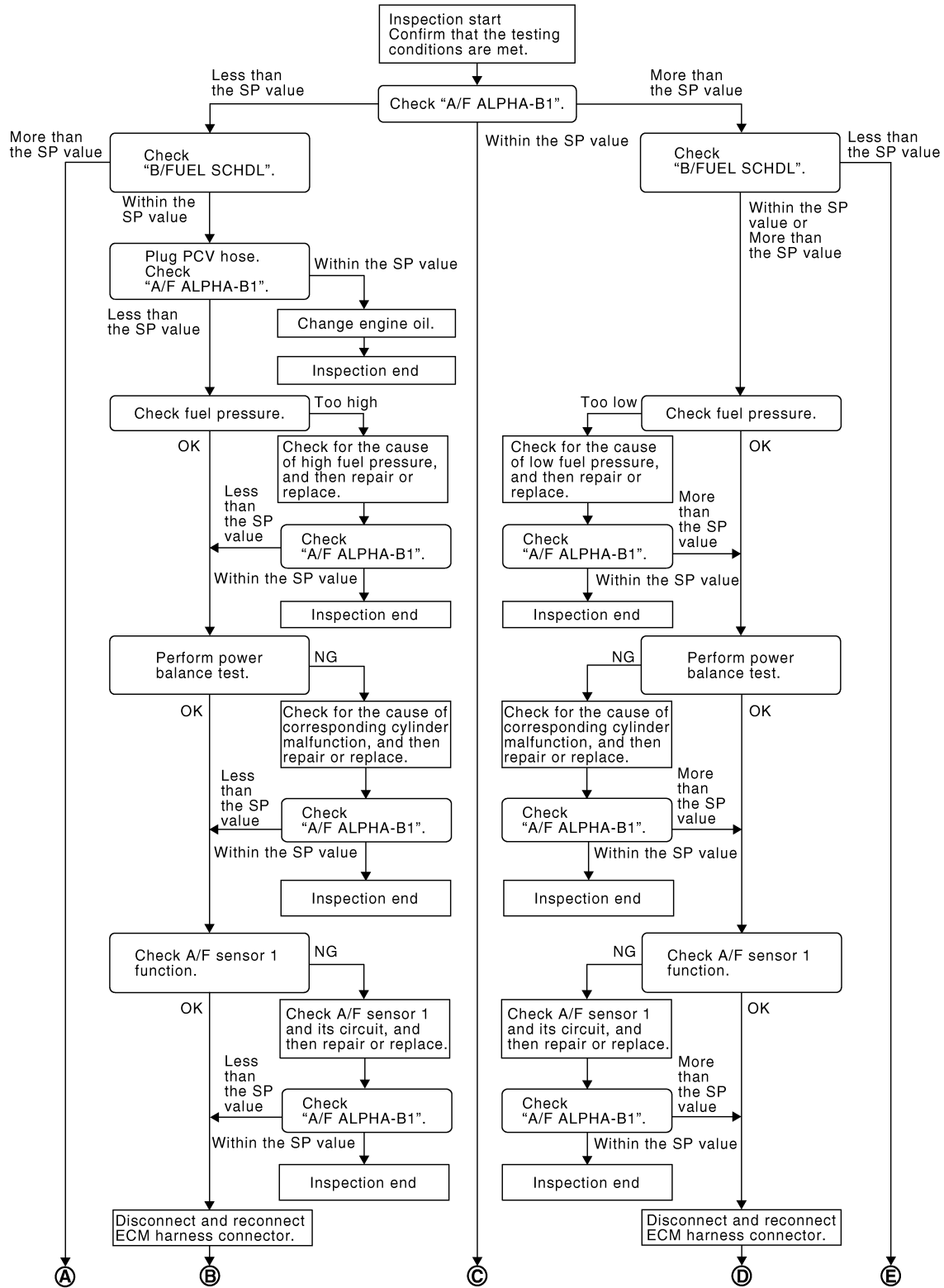
INFOID:000000005532427

OVERALL SEQUENCE

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

[MR18DE]



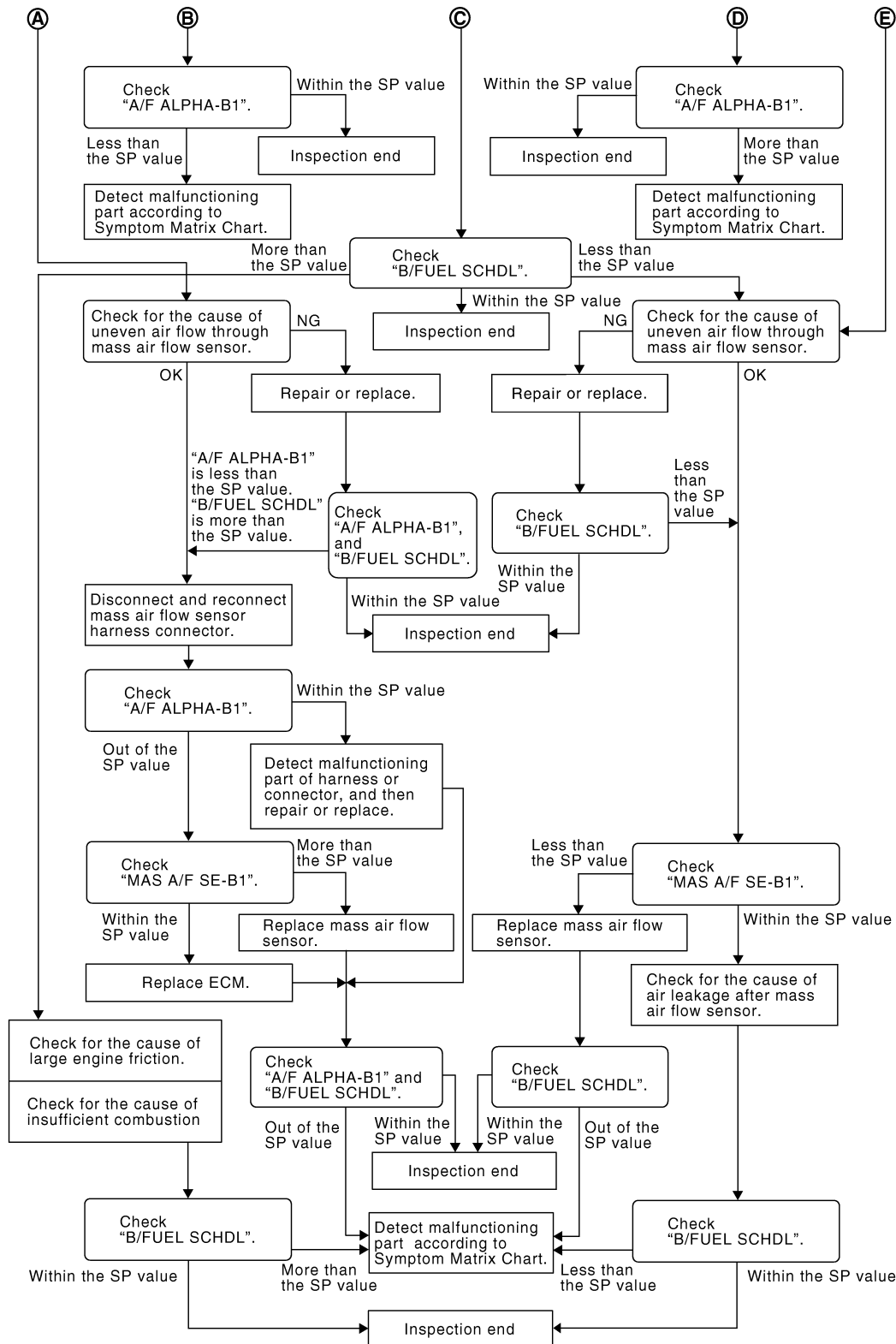
PBIB2318E

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

[MR18DE]



PBIB3213E

DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1"

1. Start engine.
2. Confirm that the testing conditions are met. Refer to [EC-624, "Testing Condition"](#).
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

NOTE:

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[MR18DE]

< SERVICE INFORMATION >

Check "A/F ALPHA-B1" for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

OK or NG

OK >> GO TO 17.

NG (Less than the SP value)>>GO TO 2.

NG (More than the SP value)>>GO TO 3.

2.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 4.

NG (More than the SP value)>>GO TO 19.

3.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 6.

NG (More than the SP value)>>GO TO 6.

NG (Less than the SP value)>>GO TO 25.

4.CHECK "A/F ALPHA-B1"

1. Stop the engine.
2. Disconnect PCV hose, and then plug it.
3. Start engine.
4. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 5.

NG >> GO TO 6.

5.CHANGE ENGINE OIL

1. Stop the engine.
2. Change engine oil. Refer to [LU-18, "Changing Engine Oil"](#).

NOTE:

This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving conditions (such as when engine oil temperature does not rise enough since a journey distance is too short during winter). The symptom will not be detected after changing engine oil or changing driving condition.

>> **INSPECTION END**

6.CHECK FUEL PRESSURE

Check fuel pressure. (Refer to [EC-582, "Fuel Pressure Check"](#).)

OK or NG

OK >> GO TO 9.

NG (Fuel pressure is too high)>>Replace fuel pressure regulator, refer to [EC-582, "Fuel Pressure Check"](#).
GO TO 8.

NG (Fuel pressure is too low)>>GO TO 7.

7.DETECT MALFUNCTIONING PART

1. Check the following.
 - Clogged and bent fuel hose and fuel tube
 - Clogged fuel filter
 - Fuel pump and its circuit (Refer to [EC-1014](#).)
2. If NG, repair or replace the malfunctioning part. (Refer to [EC-582, "Fuel Pressure Check"](#).)
If OK, replace fuel pressure regulator.

>> GO TO 8.

8. CHECK "A/F ALPHA-B1"

1. Start engine.
2. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 9.

9. PERFORM POWER BALANCE TEST

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Make sure that the each cylinder produces a momentary engine speed drop.

OK or NG

- OK >> GO TO 12.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

1. Check the following.
 - Ignition coil and its circuit (Refer to [EC-1019](#).)
 - Fuel injector and its circuit (Refer to [EC-1009](#).)
 - Intake air leakage
 - Low compression pressure (Refer to [EM-181, "On-Vehicle Service"](#).)
2. If NG, repair or replace the malfunctioning part.
If OK, replace fuel injector. (It may be caused by leakage from fuel injector or clogging.)

>> GO TO 11.

11. CHECK "A/F ALPHA-B1"

1. Start engine.
2. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 12.

12. CHECK A/F SENSOR 1 FUNCTION

Perform all DTC Confirmation Procedure related with A/F sensor 1.

- For DTC P0130, refer to [EC-704, "DTC Confirmation Procedure"](#).
- For DTC P0131, refer to [EC-710, "DTC Confirmation Procedure"](#).
- For DTC P0132, refer to [EC-716, "DTC Confirmation Procedure"](#).
- For DTC P014C, P014D, P015A, P015B, refer to [EC-751, "DTC Confirmation Procedure"](#).
- For DTC P2A00, refer to [EC-989, "DTC Confirmation Procedure"](#).

OK or NG

- OK >> GO TO 15.
NG >> GO TO 13.

13. CHECK A/F SENSOR 1 CIRCUIT

Perform Diagnostic Procedure according to corresponding DTC.

>> GO TO 14.

14. CHECK "A/F ALPHA-B1"

1. Start engine.
2. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

OK or NG

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[MR18DE]

< SERVICE INFORMATION >

- OK >> **INSPECTION END**
NG >> GO TO 15.

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

16. CHECK "A/F ALPHA-B1"

1. Start engine.
2. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

OK or NG

- OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to [EC-592. "Symptom Matrix Chart"](#).

17. CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

OK or NG

- OK >> **INSPECTION END**
NG (More than the SP value) >> GO TO 18.
NG (Less than the SP value) >> GO TO 25.

18. DETECT MALFUNCTIONING PART

1. Check for the cause of large engine friction. Refer to the following.
 - Engine oil level is too high
 - Engine oil viscosity
 - Belt tension of alternator, A/C compressor, etc. is excessive
 - Noise from engine
 - Noise from transmission, etc.
2. Check for the cause of insufficient combustion. Refer to the following.
 - Valve clearance malfunction
 - Intake valve timing control function malfunction
 - Camshaft sprocket installation malfunction, etc.

>> Repair or replace malfunctioning part, and then GO TO 30.

19. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

OK or NG

- OK >> GO TO 21.
NG >> Repair or replace malfunctioning part, and then GO TO 20.

20. CHECK "A/F ALPHA-B1" AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1" and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the each indication is within the SP value.

OK or NG

- OK >> **INSPECTION END**
NG ("B/FUEL SCHDL" is more, "A/F ALPHA-B1" is less than the SP value) >> GO TO 21.

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[MR18DE]

< SERVICE INFORMATION >

2. Disconnect mass air flow sensor harness connector. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

22.CHECK "A/F ALPHA-B1"

1. Start engine.
2. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

OK or NG

- OK >> 1. Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to [EC-664](#).
2. GO TO 29.

NG >> GO TO 23.

23.CHECK "MAS A/F SE-B1"

Select "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 24.

NG (More than the SP value)>>Replace mass air flow sensor, and then GO TO 29.

24.REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS(NATS) system and registration of all NVIS(NATS) ignition key IDs. Refer to [BL-249, "ECM Re-communicating Function"](#).
3. Perform [EC-580, "VIN Registration"](#).
4. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).
5. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
6. Perform [EC-580, "Idle Air Volume Learning"](#).

>> GO TO 29.

25.CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

OK or NG

OK >> GO TO 27.

NG >> Repair or replace malfunctioning part, and then GO TO 26.

26.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG (Less than the SP value)>>GO TO 27.

27.CHECK "MAS A/F SE-B1"

Select "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 28.

NG (Less than the SP value)>>Replace mass air flow sensor, and then GO TO 30.

28.CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[MR18DE]

< SERVICE INFORMATION >

- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts
- Malfunctioning seal of intake air system, etc.

>> GO TO 30.

29. CHECK "A/F ALPHA-B1" AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1" and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG >> Detect malfunctioning part according to [EC-592. "Symptom Matrix Chart"](#).

30. CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and then make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG >> Detect malfunctioning part according to [EC-592. "Symptom Matrix Chart"](#).

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

< SERVICE INFORMATION >

[MR18DE]

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

Description

INFOID:000000005532428

Intermittent incidents may occur. In many cases, the malfunction resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of Intermittent Incidents occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

Common Intermittent Incidents Report Situations

STEP in Work Flow	Situation
2	The CONSULT-III is used. The SELF-DIAG RESULTS screen shows time data other than 0 or [1t].
3 or 4	The symptom described by the customer does not recur.
5	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
10	The Diagnostic Procedure for PXXXX does not indicate the malfunctioning area.

Diagnosis Procedure

INFOID:000000005532429

1.INSPECTION START

Erase (1st trip) DTCs.

Refer to [EC-542, "Emission-related Diagnostic Information"](#).

>> GO TO 2.

2.CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.

Refer to [EC-638, "Ground Inspection"](#).

OK or NG

OK >> GO TO 3.

NG >> Repair or replace.

3.SEARCH FOR ELECTRICAL INCIDENT

Perform [GI-25, "How to Perform Efficient Diagnosis for an Electrical Incident"](#), "INCIDENT SIMULATION TESTS".

OK or NG

OK >> GO TO 4.

NG >> Repair or replace.

4.CHECK CONNECTOR TERMINALS

Refer to [GI-22, "How to Check Terminal"](#), "HOW TO PROBE CONNECTORS", "How to Check Enlarged Contact Spring of Terminal".

OK or NG

OK >> **INSPECTION END**

NG >> Repair or replace connector.

POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

[MR18DE]

POWER SUPPLY AND GROUND CIRCUIT

Wiring Diagram

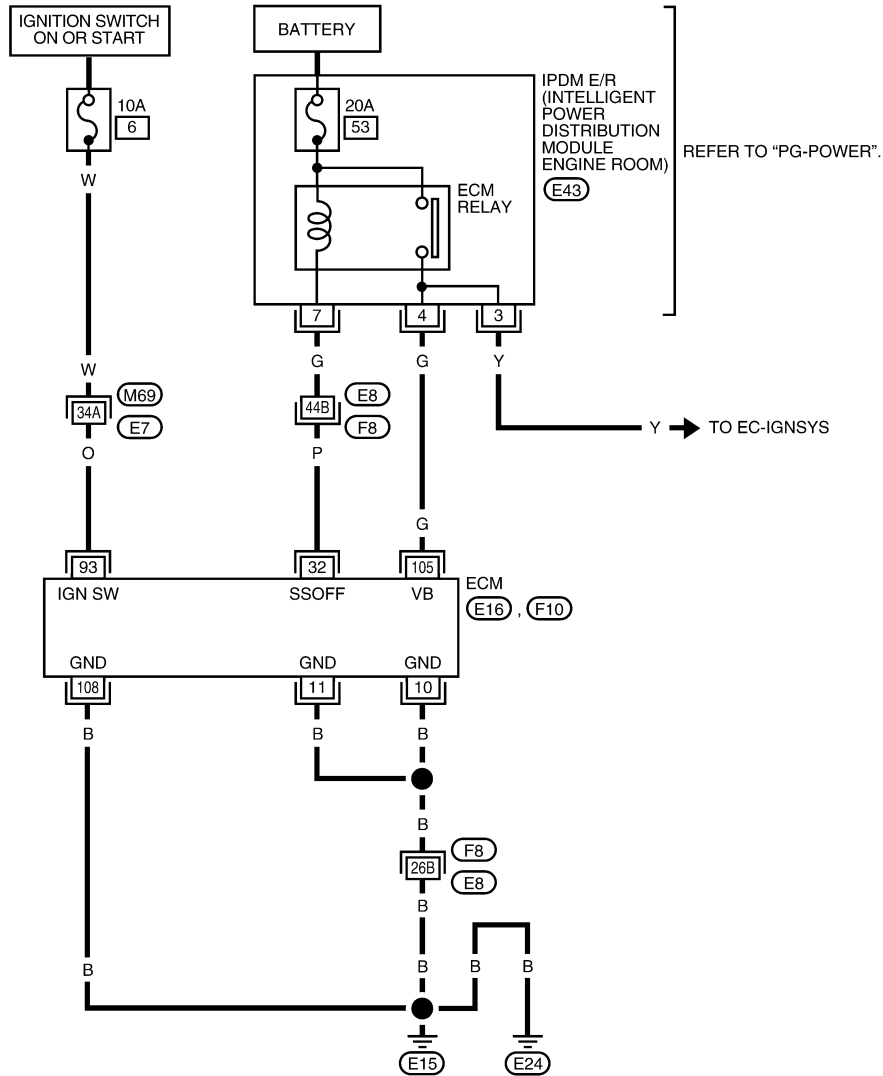
INFOID:000000005532430

EC-MAIN-01

A

EC

— : DETECTABLE LINE FOR DTC
- - - : NON-DETECTABLE LINE FOR DTC



C

D

E

F

G

H

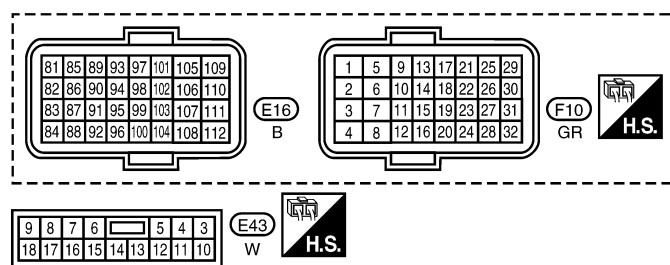
I

J

K

L

M



REFER TO THE FOLLOWING.
(M69), (F8) - SUPER
MULTIPLE JUNCTION (SMJ)

N

O

P

BBWA2625E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

[MR18DE]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
10 11	B B	ECM ground	[Engine is running] • Idle speed	Body ground
32	P	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.0 V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
93	O	Ignition switch	[Ignition switch: OFF]	0 V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
105	G	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
108	B	ECM ground	[Engine is running] • Idle speed	Body ground

Diagnosis Procedure

INFOID:000000005532431

1. INSPECTION START

Start engine.

Is engine running?

Yes or No

Yes >> GO TO 8.

No >> GO TO 2.

2. CHECK ECM POWER SUPPLY CIRCUIT-I

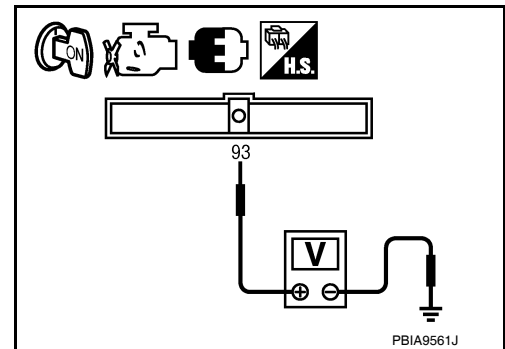
- Turn ignition switch OFF and then ON.
- Check voltage between ECM terminal 93 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.

NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M69, E7
- 10 A fuse
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

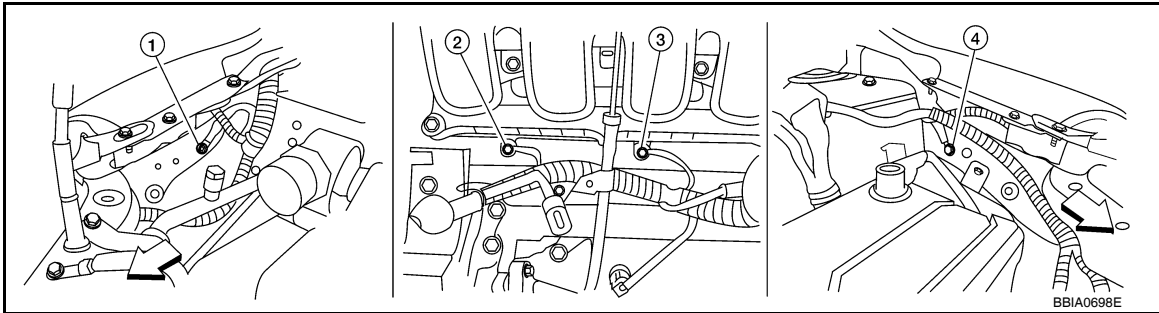
4. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten ground screw on the body.
Refer to [EC-638, "Ground Inspection"](#).

POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

[MR18DE]



← Vehicle front

1. Body ground E24

2. Engine ground F9

3. Engine ground F16

4. Body ground E15

OK or NG

OK >> GO TO 5.

NG >> Repair or replace ground connections.

5. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 10, 11, 108 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 7.

NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F8, E8
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

7. CHECK ECM POWER SUPPLY CIRCUIT-II

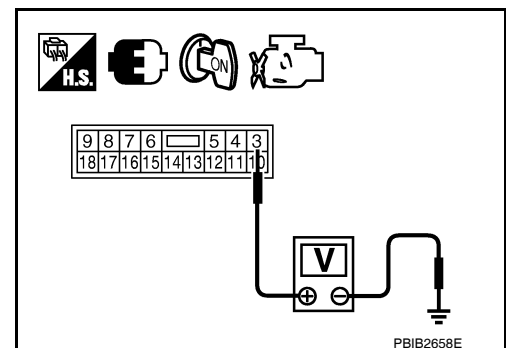
1. Reconnect ECM harness connector.
2. Turn ignition switch ON.
3. Check voltage between IPDM E/R terminal 3 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> Go to [EC-1019](#).

NG >> GO TO 8.



8. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON and then OFF.

POWER SUPPLY AND GROUND CIRCUIT

[MR18DE]

< SERVICE INFORMATION >

3. Check voltage between ECM terminal 105 and ground with CONSULT-III or tester.

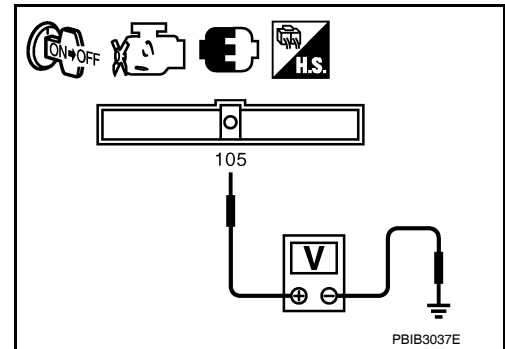
Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0 V.

OK or NG

OK >> GO TO 14.

NG (Battery voltage does not exist.)>>GO TO 9.

NG (Battery voltage exists for more than a few seconds.)>>GO TO 11.



9. CHECK ECM POWER SUPPLY CIRCUIT-IV

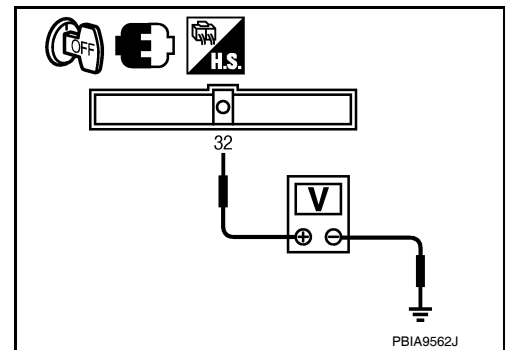
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Check voltage between ECM terminal 32 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 10.

NG >> GO TO 11.



10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E43.
3. Check harness continuity between ECM terminal 105 and IPDM E/R terminal 4. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 17.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ECM POWER SUPPLY CIRCUIT-VI

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E43.
3. Check harness continuity between ECM terminal 32 and IPDM E/R terminal 7. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.

NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

POWER SUPPLY AND GROUND CIRCUIT

[MR18DE]

< SERVICE INFORMATION >

13. CHECK 20 A FUSE

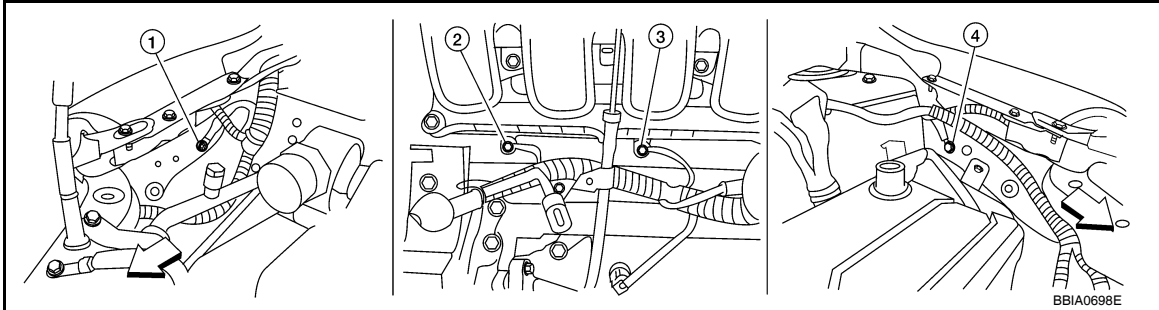
1. Disconnect 20 A fuse from IPDM E/R.
2. Check 20 A fuse.

OK or NG

- OK >> GO TO 17.
NG >> Replace 20 A fuse.

14. CHECK GROUND CONNECTIONS

1. Loosen and retighten ground screw on the body.
Refer to [EC-638, "Ground Inspection"](#).



← Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

- OK >> GO TO 15.
NG >> Repair or replace ground connections.

15. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 10, 11, 108 and ground.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 17.
NG >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F8, E8
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

17. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-28, "Removal and Installation of IPDM E/R"](#).
NG >> Repair open circuit or short to power in harness or connectors.

POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

[MR18DE]

Ground Inspection

INFOID:000000005532432

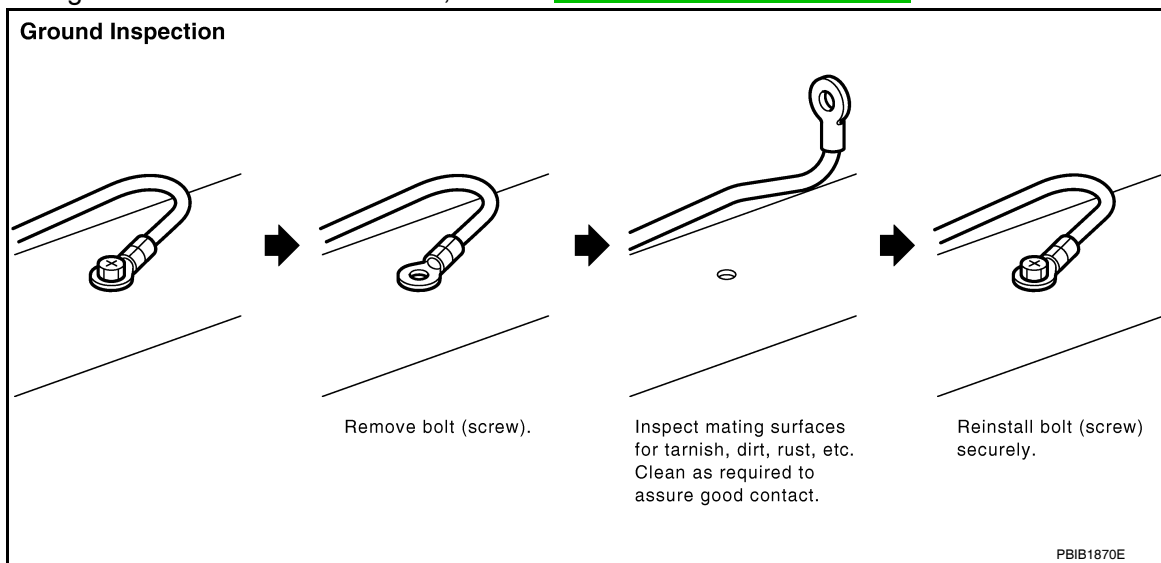
Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.

Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.

When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for "add-on" accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to [PG-30. "Ground Distribution"](#).



DTC U0101 CAN COMMUNICATION LINE

< SERVICE INFORMATION >

[MR18DE]

DTC U0101 CAN COMMUNICATION LINE

Description

INFOID:000000005532433

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

INFOID:000000005532434

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0101 0101	Lost communication with TCM	When ECM is not transmitting or receiving CAN communication signal of OBD (emission-related diagnosis) with TCM for 2 seconds or more.	<ul style="list-style-type: none">CAN communication line between TCM and ECMCAN communication line is open or shorted.

DTC Confirmation Procedure

INFOID:000000005532435

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.
3. If DTC is detected, go to [EC-640. "Diagnosis Procedure"](#).

DTC U0101 CAN COMMUNICATION LINE

[MR18DE]

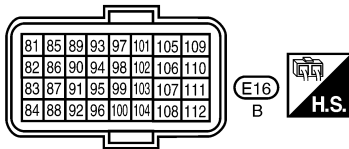
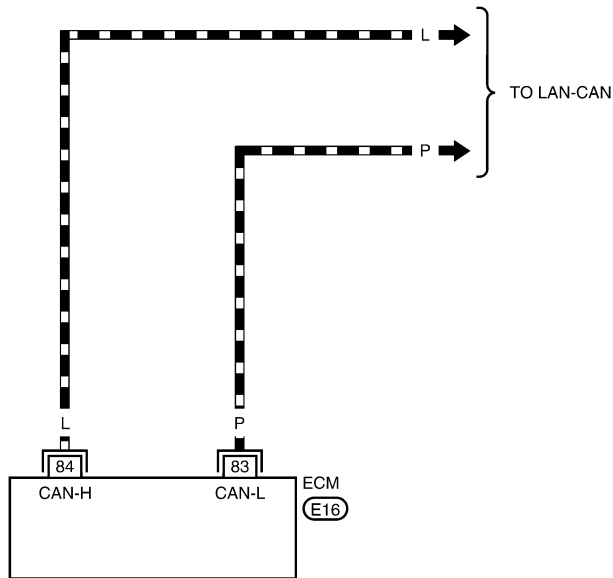
< SERVICE INFORMATION >

INFOID:000000005532436

Wiring Diagram

EC-CAN-01

- : DETECTABLE LINE FOR DTC
- : NON-DETECTABLE LINE FOR DTC
- ▬ : DATA LINE



BBWA2626E

Diagnosis Procedure

INFOID:000000005532437

Go to [LAN-26, "CAN System Specification Chart"](#).

DTC U0140 CAN COMMUNICATION LINE

< SERVICE INFORMATION >

[MR18DE]

DTC U0140 CAN COMMUNICATION LINE

Description

INFOID:000000005532438

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

INFOID:000000005532439

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0140 0140	Lost communication with BCM	When ECM is not transmitting or receiving CAN communication signal of OBD (emission-related diagnosis) with BCM for 2 seconds or more.	<ul style="list-style-type: none">• CAN communication line between BCM and ECM• CAN communication line is open or shorted.

DTC Confirmation Procedure

INFOID:000000005532440

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.
3. If DTC is detected, go to [EC-642. "Diagnosis Procedure"](#).

DTC U0140 CAN COMMUNICATION LINE

[MR18DE]

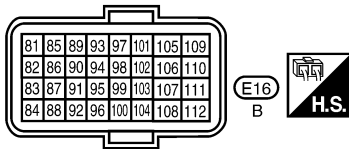
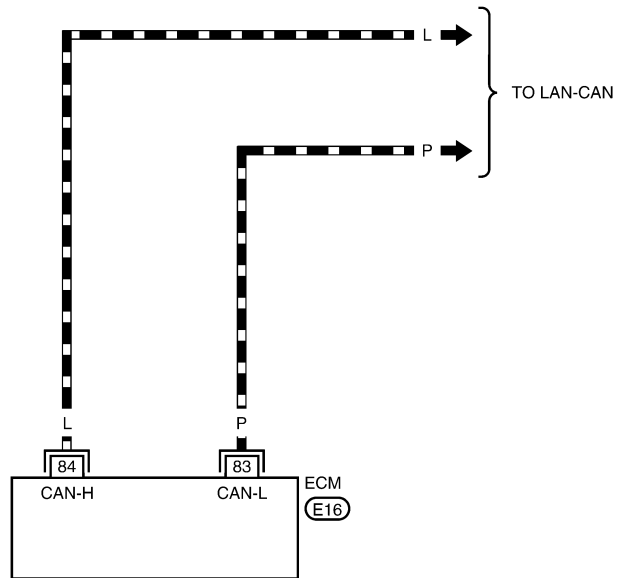
< SERVICE INFORMATION >

INFOID:000000005532441

Wiring Diagram

EC-CAN-01

- : DETECTABLE LINE FOR DTC
- : NON-DETECTABLE LINE FOR DTC
- - - : DATA LINE



BBWA2626E

Diagnosis Procedure

INFOID:000000005532442

Go to [LAN-26, "CAN System Specification Chart"](#).

DTC U1001 CAN COMMUNICATION LINE

< SERVICE INFORMATION >

[MR18DE]

DTC U1001 CAN COMMUNICATION LINE

Description

INFOID:000000005532443

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

INFOID:000000005532444

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1001 1001	CAN communication line	When ECM is not transmitting or receiving CAN communication signal other than OBD (emission-related diagnosis) for 2 seconds or more.	<ul style="list-style-type: none">Harness or connectors (CAN communication line is open or shorted.)

DTC Confirmation Procedure

INFOID:000000005532445

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-644. "Diagnosis Procedure"](#).

DTC U1001 CAN COMMUNICATION LINE

[MR18DE]

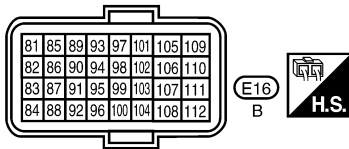
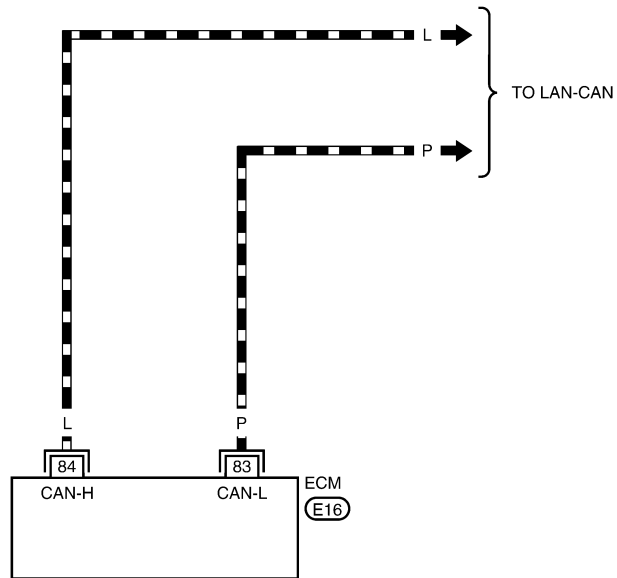
< SERVICE INFORMATION >

INFOID:000000005532446

Wiring Diagram

EC-CAN-01

- : DETECTABLE LINE FOR DTC
- : NON-DETECTABLE LINE FOR DTC
- ▬ : DATA LINE



BBWA2626E

Diagnosis Procedure

INFOID:000000005532447

Go to [LAN-26, "CAN System Specification Chart"](#).

DTC P0011 IVT CONTROL

[MR18DE]

< SERVICE INFORMATION >

DTC P0011 IVT CONTROL

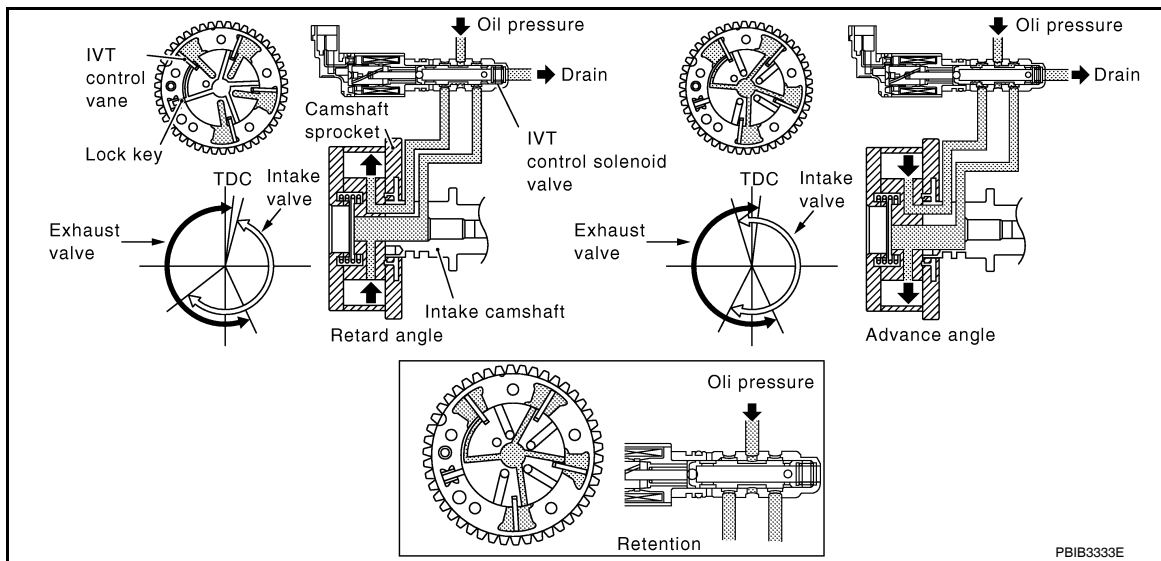
Description

INFOID:000000005532448

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed and piston position	Intake valve timing control	Intake valve timing control solenoid valve
Engine coolant temperature sensor	Engine coolant temperature		
ABS actuator and electric unit (control unit) Combination meter	Vehicle speed*		

*: This signal is sent to the ECM through CAN communication line.



This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve. The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532449

Specification data are reference values.

Monitor item	Condition	Specification
INT/V TIM (B1)	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle -5° - 5°CA
	When revving engine up to 2,000 rpm quickly	Approx. 0° - 40°CA
INT/V SOL (B1)	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle 0% - 2%
	When revving engine up to 2,000 rpm quickly	Approx. 0% - 90%

DTC P0011 IVT CONTROL

< SERVICE INFORMATION >

[MR18DE]

On Board Diagnosis Logic

INFOID:000000005532450

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0011 0011	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	<ul style="list-style-type: none"> • Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Intake valve timing control solenoid valve • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Foreign matter caught in the oil groove for intake valve timing control

FAIL-SAFE MODE

ECM enters in fail-safe mode when the malfunction is detected.

Detected items	Engine operating condition in fail-safe mode
Intake valve timing control	The signal is not energized to the solenoid valve and the valve control does not function

DTC Confirmation Procedure

INFOID:000000005532451

CAUTION:

Always drive at a safe speed.

NOTE:

- If DTC P0011 is displayed with DTC P0075, first perform trouble diagnosis for DTC P0075. See [EC-659](#).
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10 V and 16 V at idle.

Ⓟ WITH CONSULT-III

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 6 consecutive seconds.
Hold the accelerator pedal as steady as possible.

ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 3.87 msec
Shift lever	P or N position (A/T, CVT) Neutral position (M/T)

4. Let engine idle for 10 seconds.
5. If 1st trip DTC is detected, go to [EC-647, "Diagnosis Procedure"](#).
If 1st trip DTC is not detected, go to next step.
6. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	1,200 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 65°C (149°F)
Shift lever	1st or 2nd position
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

7. If 1st trip DTC is detected, go to [EC-647, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT-III" above.

Diagnosis Procedure

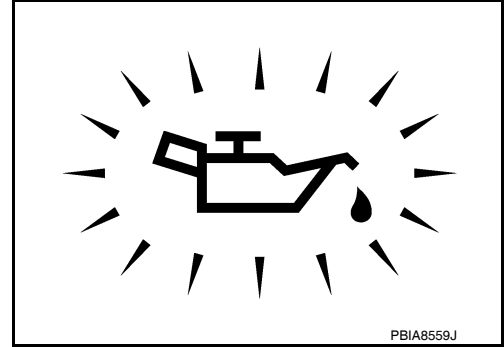
INFOID:000000005532452

1. CHECK OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check oil pressure warning lamp and confirm it is not illuminated.

OK or NG

- OK >> GO TO 2.
- NG >> Go to [LU-17. "Inspection"](#).



2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EC-648. "Component Inspection"](#).

OK or NG

- OK >> GO TO 3.
- NG >> Replace intake valve timing control solenoid valve.

3. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to [EC-798. "Component Inspection"](#).

OK or NG

- OK >> GO TO 4.
- NG >> Replace crankshaft position sensor (POS).

4. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-803. "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.
- NG >> Replace camshaft position sensor (PHASE).

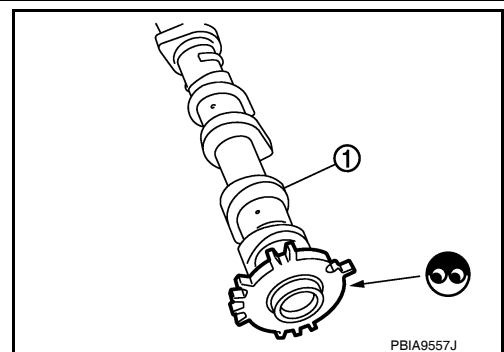
5. CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end

OK or NG

- OK >> GO TO 6.
- NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



6. CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

Yes or No

- Yes >> Check timing chain installation. Refer to [EM-157. "Removal and Installation"](#).
- No >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

< SERVICE INFORMATION >

Refer to [EM-166. "Removal and Installation"](#).

OK or NG

- OK >> GO TO 8.
- NG >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

For Wiring Diagram, refer to [EC-794. "Wiring Diagram"](#) for CKP sensor (POS) and [EC-800. "Wiring Diagram"](#) for CMP sensor (PHASE).

>> INSPECTION END

Component Inspection

INFOID:000000005532453

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve as follows.

Terminal	Resistance
1 and 2	6.7 - 7.7 Ω [at 20°C (68°F)]
1 or 2 and ground	∞ Ω (Continuity should not exist.)

If NG, replace intake valve timing control solenoid valve.
If OK, go to next step.

3. Remove intake valve timing control solenoid valve.
4. Provide 12 V DC between intake valve timing control solenoid valve terminals and then interrupt it. Make sure that the plunger moves as shown in the figure.

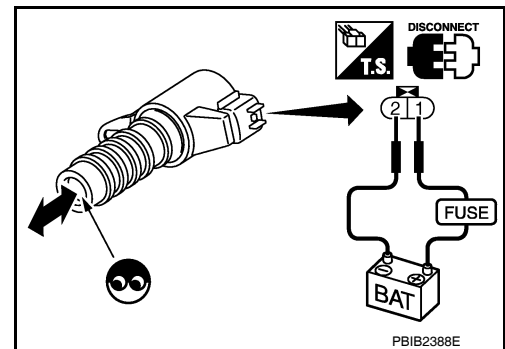
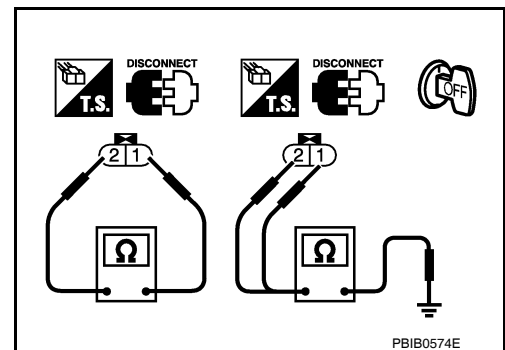
CAUTION:

Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

If NG, replace intake valve timing control solenoid valve.

NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.



Removal and Installation

INFOID:000000005532454

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EM-157. "Removal and Installation"](#).

DTC P0031, P0032 A/F SENSOR 1 HEATER

< SERVICE INFORMATION >

[MR18DE]

DTC P0031, P0032 A/F SENSOR 1 HEATER

Description

INFOID:000000005532455

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Air fuel ratio (A/F) sensor 1 heater control	Air fuel ratio (A/F) sensor 1 heater
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF duty control of the A/F sensor 1 heater corresponding to the engine operating condition to keep the temperature of A/F sensor 1 element at the specified range.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532456

Specification data are reference values.

Monitor item	Condition	Specification
A/F S1 HTR (B1)	• Engine: After warming up, idle the engine (More than 140 seconds after starting engine.)	4 - 100%

On Board Diagnosis Logic

INFOID:000000005532457

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031 0031	Air fuel ratio (A/F) sensor 1 heater control circuit low	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. [An excessively low voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.]	• Harness or connectors [Air fuel ratio (A/F) sensor 1 heater circuit is open or shorted.] • Air fuel ratio (A/F) sensor 1 heater
P0032 0032	Air fuel ratio (A/F) sensor 1 heater control circuit high	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. [An excessively high voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.]	• Harness or connectors [Air fuel ratio (A/F) sensor 1 heater circuit is shorted.] • Air fuel ratio (A/F) sensor 1 heater

DTC Confirmation Procedure

INFOID:000000005532458

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10.5 V and 16 V at idle.

1. Start engine and run it for at least 10 seconds at idle speed.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-651, "Diagnosis Procedure"](#).

DTC P0031, P0032 A/F SENSOR 1 HEATER

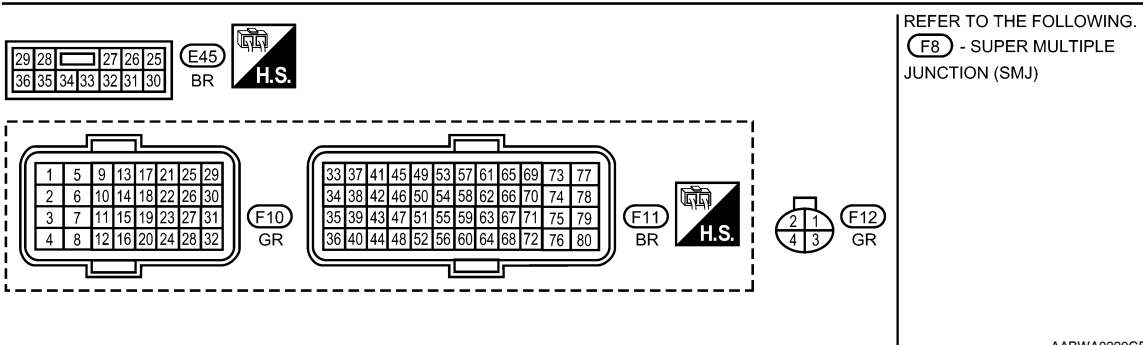
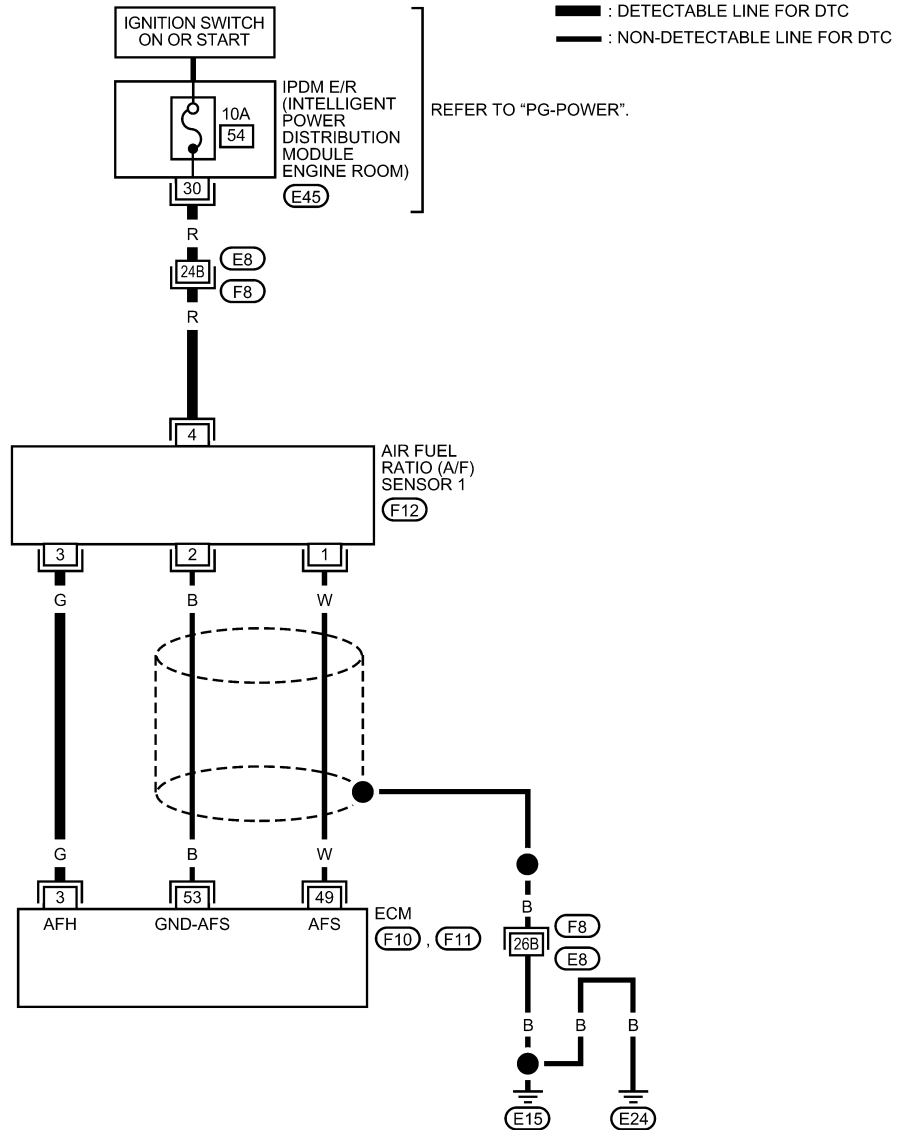
< SERVICE INFORMATION >

[MR18DE]

Wiring Diagram

INFOID:000000005532459

EC-A/FH-01



AABWA0320GB

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

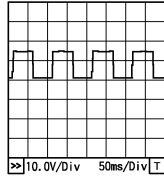
CAUTION:

DTC P0031, P0032 A/F SENSOR 1 HEATER

< SERVICE INFORMATION >

[MR18DE]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8 V★  PBI A8148J
49	W	A/F sensor 1	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 1.8 V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	[Ignition switch: ON]	Approximately 2.2 V

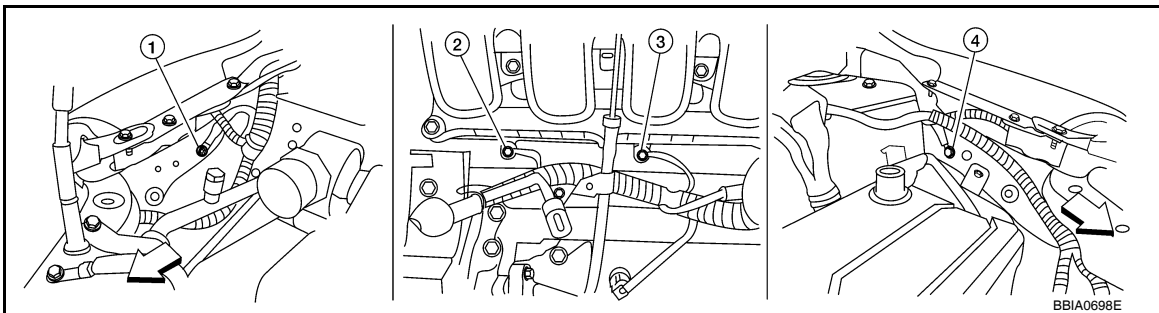
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005532460

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
Refer to [EC-638, "Ground Inspection"](#).



↩: Vehicle front

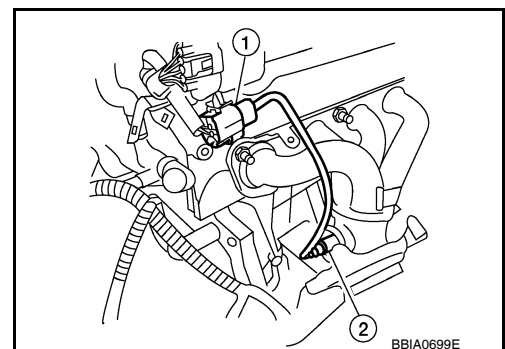
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace ground connections.

2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector (1).
 2. Turn ignition switch ON.
- Air fuel ratio (A/F) sensor 1 (2)



DTC P0031, P0032 A/F SENSOR 1 HEATER

[MR18DE]

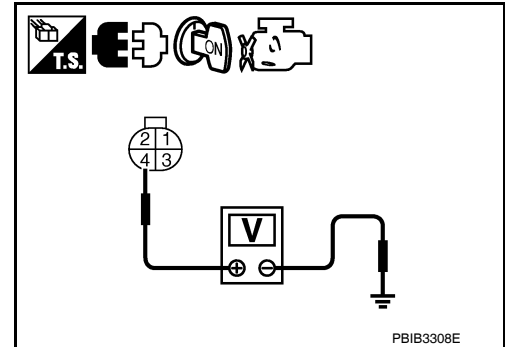
< SERVICE INFORMATION >

3. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
- NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK A/F SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 3 and A/F sensor 1 terminal 3.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK A/F SENSOR 1 HEATER

Refer to [EC-652, "Component Inspection"](#).

OK or NG

- OK >> GO TO 6.
- NG >> Replace air fuel ratio (A/F) sensor 1.

6. CHECK INTERMITTENT INCIDENT

Perform [EC-632](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005532461

AIR FUEL RATIO (A/F) SENSOR 1 HEATER

DTC P0031, P0032 A/F SENSOR 1 HEATER

[MR18DE]

< SERVICE INFORMATION >

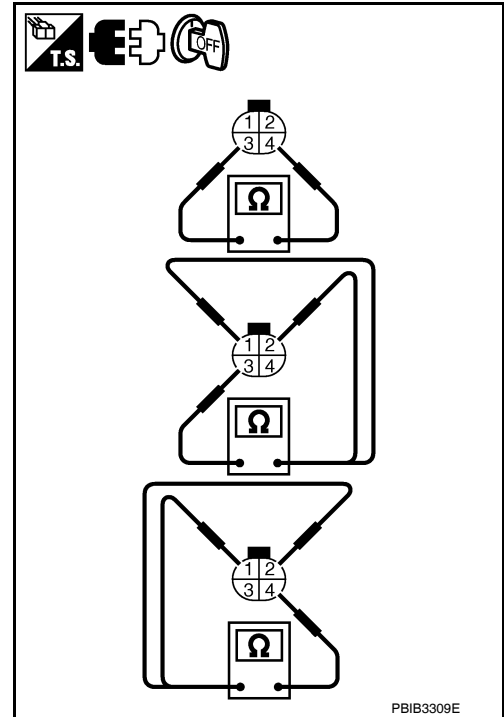
1. Check resistance between A/F sensor 1 terminals as follows.

Terminal No.	Resistance
3 and 4	1.8 - 2.44 Ω [at 25°C (77°F)]
3 and 1, 2	$\infty \Omega$ (Continuity should not exist)
4 and 1, 2	$\infty \Omega$ (Continuity should not exist)

2. If NG, replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.



INFOID:000000005532462

Removal and Installation

AIR FUEL RATIO SENSOR HEATER

Refer to [EM-140, "Removal and Installation"](#).

DTC P0037, P0038 HO2S2 HEATER

< SERVICE INFORMATION >

[MR18DE]

DTC P0037, P0038 HO2S2 HEATER

Description

INFOID:000000005532463

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Crankshaft position sensor (POS)			
Engine coolant temperature sensor	Engine coolant temperature		
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,600	OFF
<ul style="list-style-type: none"> • Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	ON

CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532464

Specification data are reference values.

Monitor item	Condition	Specification
HO2S2 HTR (B1)	<ul style="list-style-type: none"> • Engine speed: Below 3,600 rpm after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. 	ON
	<ul style="list-style-type: none"> • Engine speed: Above 3,600 rpm 	OFF

On Board Diagnosis Logic

INFOID:000000005532465

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037 0037	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	<ul style="list-style-type: none"> • Harness or connectors (Heated oxygen sensor 2 heater circuit is open or shorted.) • Heated oxygen sensor 2 heater
P0038 0038	Heated oxygen sensor 2 heater control circuit high	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	<ul style="list-style-type: none"> • Harness or connectors (Heated oxygen sensor 2 heater circuit is shorted.) • Heated oxygen sensor 2 heater

DTC Confirmation Procedure

INFOID:000000005532466

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10.5 V and 16 V at idle.

1. Start engine and warm it up to the normal operating temperature.

DTC P0037, P0038 HO2S2 HEATER

[MR18DE]

< SERVICE INFORMATION >

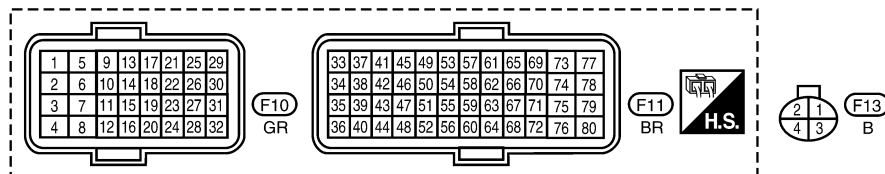
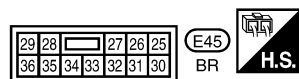
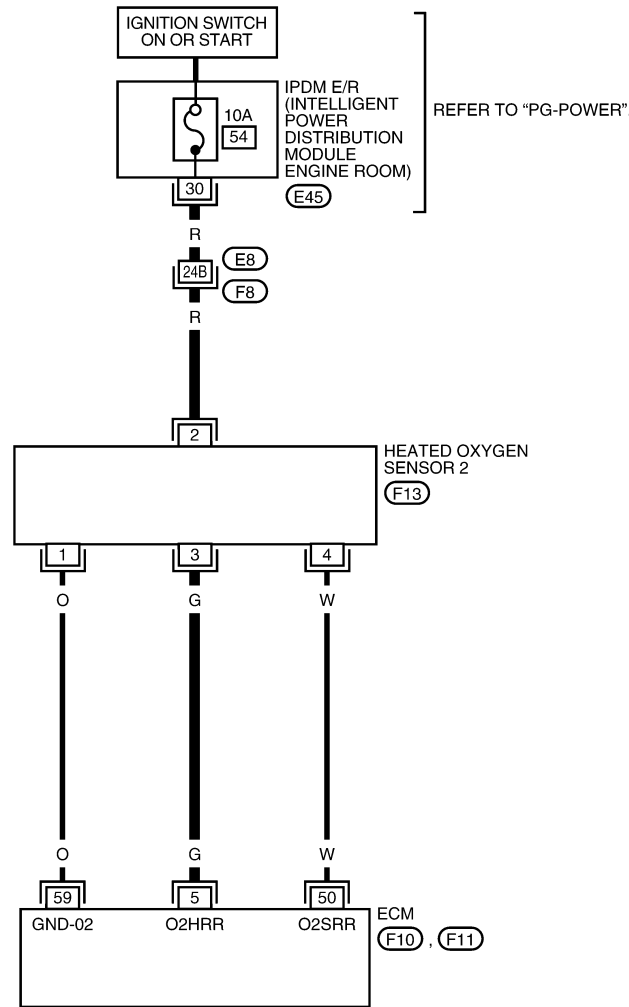
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-656, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000005532467

EC-HO2S2H-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

(F8) - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2628E

DTC P0037, P0038 HO2S2 HEATER

< SERVICE INFORMATION >

[MR18DE]

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	G	Heated oxygen sensor 2 heater	[Engine is running] <ul style="list-style-type: none"> Engine speed: Below 3,600 rpm after the following conditions are met. Engine: After warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. 	Approximately 10 V★ PBI A8148J
			[Ignition switch: ON] <ul style="list-style-type: none"> Engine stopped [Engine is running] <ul style="list-style-type: none"> Engine speed: Above 3,600 rpm. 	BATTERY VOLTAGE (11 - 14 V)
50	W	Heated oxygen sensor 2	[Engine is running] <ul style="list-style-type: none"> Revvng engine from idle to 3,000 rpm quickly after the following conditions are met. Engine: After warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. 	0 - Approximately 1.0 V
59	O	Sensor ground (Heated oxygen sensor 2)	[Engine is running] <ul style="list-style-type: none"> Warm-up condition Idle speed 	Approximately 0 V

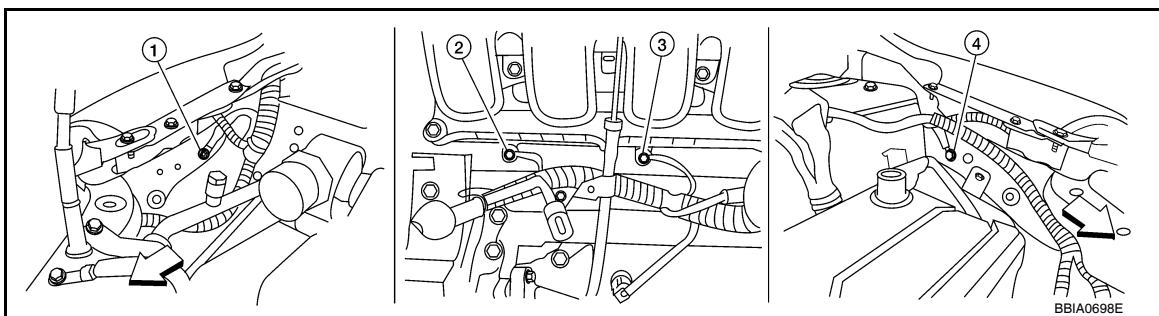
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005532468

1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten ground screw on the body.
Refer to [EC-638, "Ground Inspection"](#).



↶ Vehicle front

- Body ground E24
- Body ground E15

2. Engine ground F9

3. Engine ground F16

OK or NG

OK >> GO TO 2.

DTC P0037, P0038 HO2S2 HEATER

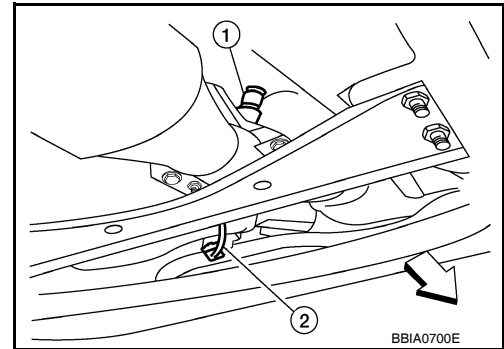
[MR18DE]

< SERVICE INFORMATION >

NG >> Repair or replace ground connections.

2.CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 2 harness connector (2).
 - ⇐: Vehicle front
 - Heated oxygen sensor 2 (1)
2. Turn ignition switch ON.

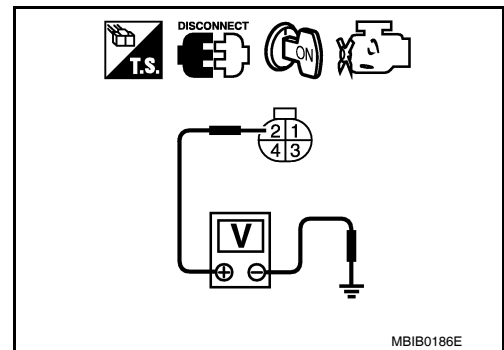


3. Check voltage between HO2S2 terminal 2 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
- NG >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 5 and HO2S2 terminal 3.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to [EC-658. "Component Inspection"](#).

OK or NG

- OK >> GO TO 6.
- NG >> Replace heated oxygen sensor 2.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

DTC P0037, P0038 HO2S2 HEATER

< SERVICE INFORMATION >

[MR18DE]

Component Inspection

INFOID:000000005532469

HEATED OXYGEN SENSOR 2 HEATER

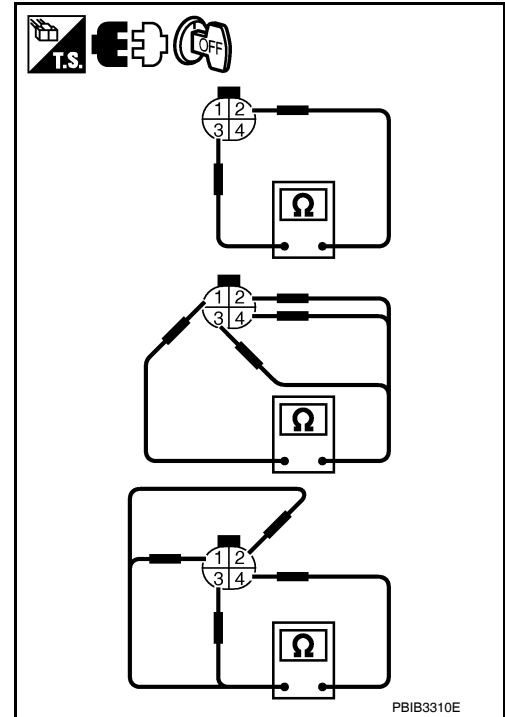
1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
2 and 3	3.4 - 4.4 Ω [at 25°C (77°F)]
1 and 2, 3, 4	$\infty \Omega$
4 and 1, 2, 3	(Continuity should not exist)

2. If NG, replace heated oxygen sensor 2.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.



Removal and Installation

INFOID:000000005532470

HEATED OXYGEN SENSOR 2

Refer to [EM-140. "Removal and Installation"](#).

DTC P0075 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[MR18DE]

DTC P0075 IVT CONTROL SOLENOID VALVE

Component Description

INFOID:000000005532471

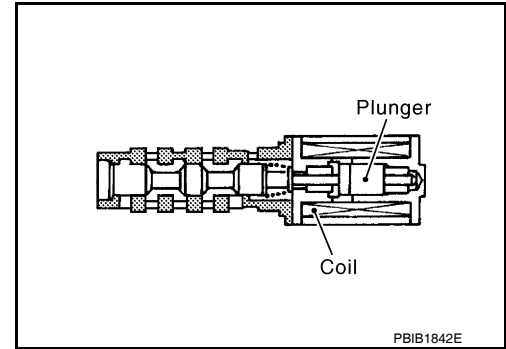
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.

The longer pulse width advances valve angle.

The shorter pulse width retards valve angle.

When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532472

Specification data are reference values.

Monitor item	Condition	Specification
INT/V SOL (B1)	<ul style="list-style-type: none"> Engine: After warming up Air conditioner switch: OFF Shift lever: P or N (A/T, CVT), Neutral (M/T) No load 	Idle
	When revving engine up to 2,000 rpm quickly	Approx. 0% - 90%

On Board Diagnosis Logic

INFOID:000000005532473

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0075 0075	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	<ul style="list-style-type: none"> Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) Intake valve timing control solenoid valve

DTC Confirmation Procedure

INFOID:000000005532474

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-661, "Diagnosis Procedure"](#).

DTC P0075 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

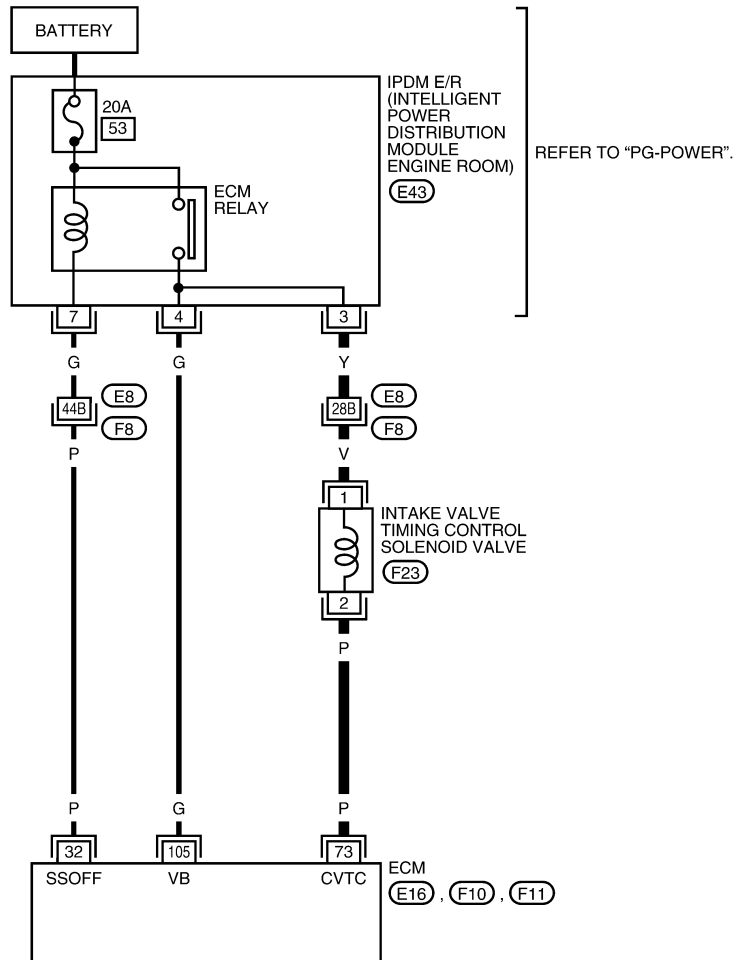
[MR18DE]

INFOID:000000005532475

Wiring Diagram

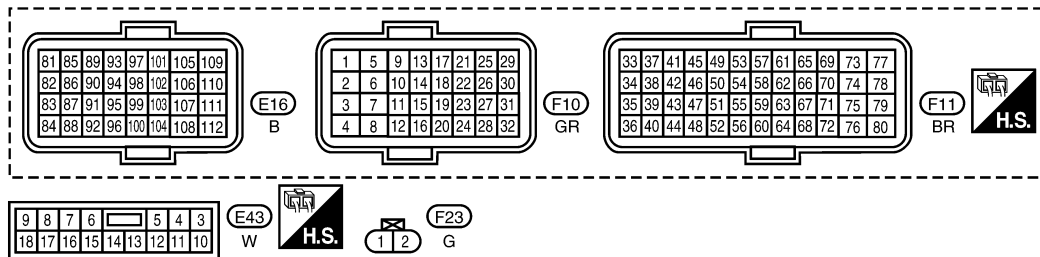
EC-IVC-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

(F8) - SUPER MULTIPLE JUNCTION (SMJ)



ABBWA0360GB

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

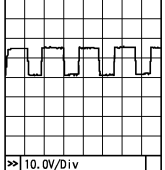
CAUTION:

DTC P0075 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[MR18DE]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	P	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.0 V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
73	P	Intake valve timing control solenoid valve	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
			[Engine is running] • Warm-up condition • When revving engine up to 2,000 rpm quickly	7 - 10 V★  PBI A4937J
105	G	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

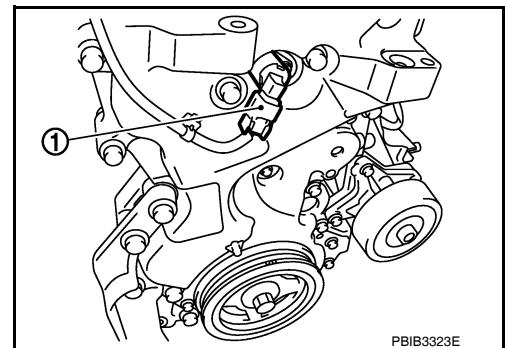
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005532476

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect intake valve timing control solenoid valve (1) harness connector.
- Turn ignition switch ON.

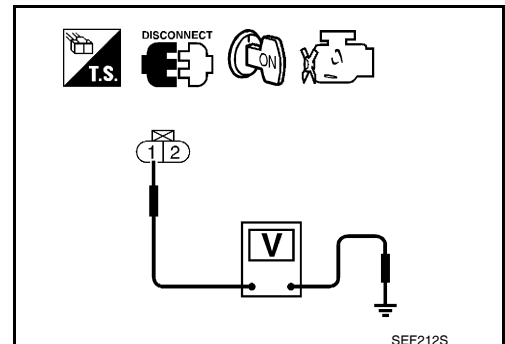


- Check voltage between intake valve timing control solenoid valve terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTION PART

Check the following.

DTC P0075 IVT CONTROL SOLENOID VALVE

[MR18DE]

< SERVICE INFORMATION >

- Harness connectors E8, F8
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R

>> Repair or replace harness or connectors.

3. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 73 and intake valve timing control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EC-662, "Component Inspection"](#).

OK or NG

OK >> GO TO 5.

NG >> Replace intake valve timing control solenoid valve.

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005532477

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve as follows.

Terminal	Resistance
1 and 2	6.7 - 7.7 Ω [at 20°C (68°F)]
1 or 2 and ground	$\infty \Omega$ (Continuity should not exist.)

If NG, replace intake valve timing control solenoid valve.

If OK, go to next step.

3. Remove intake valve timing control solenoid valve.
4. Provide 12 V DC between intake valve timing control solenoid valve terminals and then interrupt it. Make sure that the plunger moves as shown in the figure.

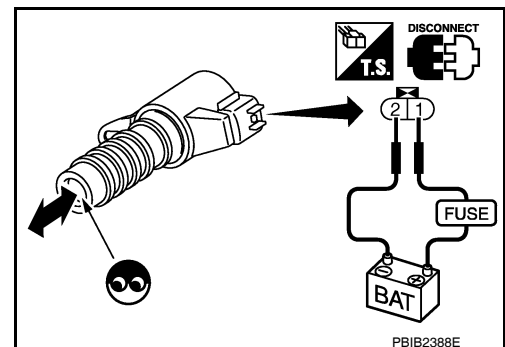
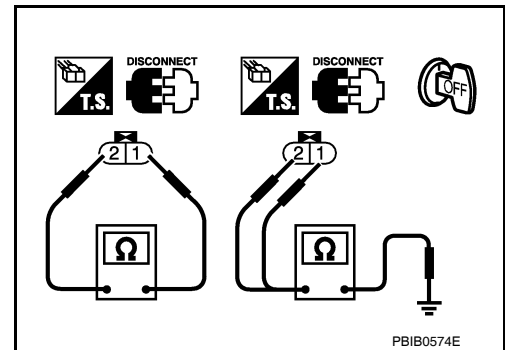
CAUTION:

Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

If NG, replace intake valve timing control solenoid valve.

NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.



DTC P0075 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[MR18DE]

Removal and Installation

INFOID:000000005532478

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EM-157, "Removal and Installation"](#).

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

DTC P0101 MAF SENSOR

[MR18DE]

< SERVICE INFORMATION >

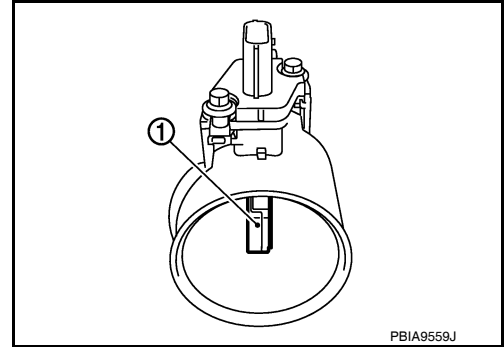
DTC P0101 MAF SENSOR

Component Description

INFOID:000000005532479

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532480

Specification data are reference values.

Monitor item	Condition	Specification
MAS A/F SE-B1	<ul style="list-style-type: none"> See EC-624. 	
CAL/LD VALUE	<ul style="list-style-type: none"> Engine: After warming up Shift lever: P or N (A/T, CVT), Neutral (M/T) Air conditioner switch: OFF No load 	Idle 10% - 35%
	2,500 rpm	10% - 35%
MASS AIRFLOW	<ul style="list-style-type: none"> Engine: After warming up Shift lever: P or N (A/T, CVT), Neutral (M/T) Air conditioner switch: OFF No load 	Idle 1.0 - 4.0 g·m/s
	2,500 rpm	4.0 - 10.0 g·m/s

On Board Diagnosis Logic

INFOID:000000005532481

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0101 0101	Mass air flow sensor circuit range/performance	A) A high voltage from the sensor is sent to ECM under light load driving condition.	<ul style="list-style-type: none"> Harness or connectors (Mass air flow sensor circuit is open or shorted.) Mass air flow sensor EVAP control system pressure sensor Intake air temperature sensor
		B) A low voltage from the sensor is sent to ECM under heavy load driving condition.	<ul style="list-style-type: none"> Harness or connectors (Mass air flow sensor circuit is open or shorted.) Intake air leaks Mass air flow sensor EVAP control system pressure sensor Intake air temperature sensor

DTC Confirmation Procedure

INFOID:000000005532482

Perform PROCEDURE FOR MALFUNCTION A first.

If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

DTC P0101 MAF SENSOR

[MR18DE]

< SERVICE INFORMATION >

PROCEDURE FOR MALFUNCTION A

NOTE:

If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch ON) instead of running engine at idle speed.

1. Start engine and warm it up to normal operating temperature.
2. Run engine for at least 10 seconds at idle speed.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to [EC-668, "Diagnosis Procedure"](#).

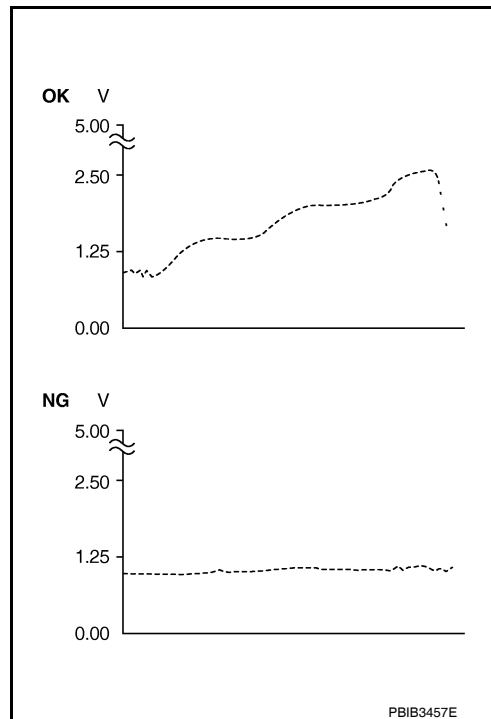
PROCEDURE FOR MALFUNCTION B

CAUTION:

Always drive vehicle at a safe speed.

④ With CONSULT-III

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
If engine cannot be started, go to [EC-668, "Diagnosis Procedure"](#).
3. Select "DATA MONITOR" mode with CONSULT-III.
4. Check the voltage of "MAS A/F SE-B1" with "DATA MONITOR".
5. Increases engine speed to about 4,000 rpm.
6. Monitor the linear voltage rise in response to engine speed increases.
If NG, go to [EC-668, "Diagnosis Procedure"](#).
If OK, go to following step.



7. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
TP SEN 1-B1	More than 1.5 V
TP SEN 2-B1	More than 1.5 V
Shift lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

8. Check 1st trip DTC.
9. If 1st trip DTC is detected, go to [EC-668, "Diagnosis Procedure"](#).

Overall Function Check

INFOID:000000005532483

PROCEDURE FOR MALFUNCTION B

Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a 1st DTC might not be confirmed.

④ With GST

DTC P0101 MAF SENSOR

[MR18DE]

< SERVICE INFORMATION >

1. Start engine and warm it up to normal operating temperature.
2. Select Service \$01 with GST.
3. Check the mass air flow sensor signal with Service \$01.
4. Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
5. If NG, go to [EC-668, "Diagnosis Procedure"](#).

CALC LOAD	20%
COOLANT TEMP	95°C
SHORT FT #1	2%
LONG FT #1	0%
SHORT FT #2	4%
LONG FT #2	0%
ENGINE SPD	2637RPM
VEHICLE SPD	0MPH
IGN ADVANCE	41.0°
INTAKE AIR	41°C
MAF	14.1gm/sec
THROTTLE POS	3%

SEF534P

DTC P0101 MAF SENSOR

< SERVICE INFORMATION >

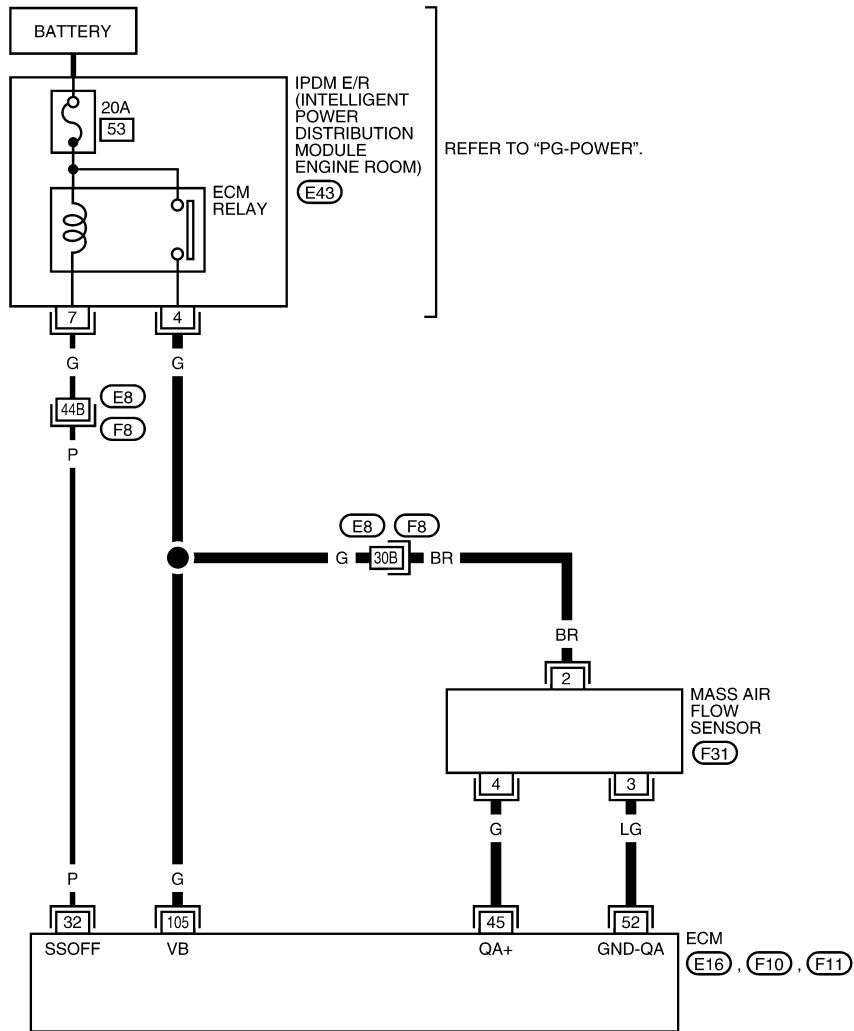
[MR18DE]

Wiring Diagram

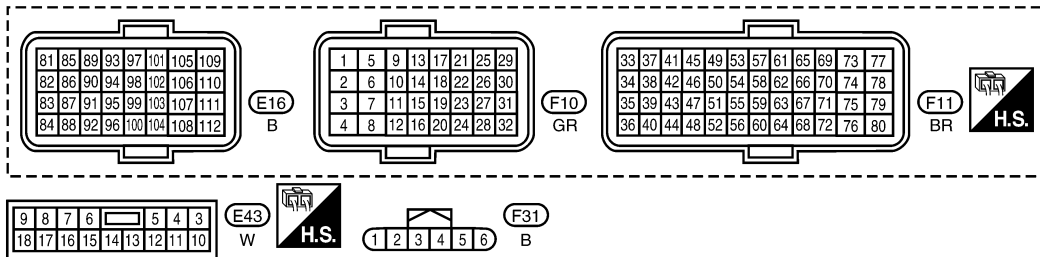
INFOID:000000005532484

EC-MAFS-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
 (F8) - SUPER MULTIPLE JUNCTION (SMJ)



BBWA2632E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0101 MAF SENSOR

< SERVICE INFORMATION >

[MR18DE]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	P	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] <ul style="list-style-type: none"> • For a few seconds after turning ignition switch OFF 	0 - 1.0 V
			[Ignition switch: OFF] <ul style="list-style-type: none"> • More than a few seconds after turning ignition switch OFF 	BATTERY VOLTAGE (11 - 14 V)
45	G	Mass air flow sensor	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	0.9 - 1.2 V
			[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Engine speed: 2,500 rpm 	1.5 - 1.8 V
52	LG	Sensor ground (Mass air flow sensor)	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	Approximately 0 V
105	G	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

Diagnosis Procedure

INFOID:000000005532485

1. INSPECTION START

Which malfunction (A or B) is duplicated?

A or B

- A >> GO TO 3.
- B >> GO TO 2.

2. CHECK INTAKE AIR LEAK

Check the following for connections.

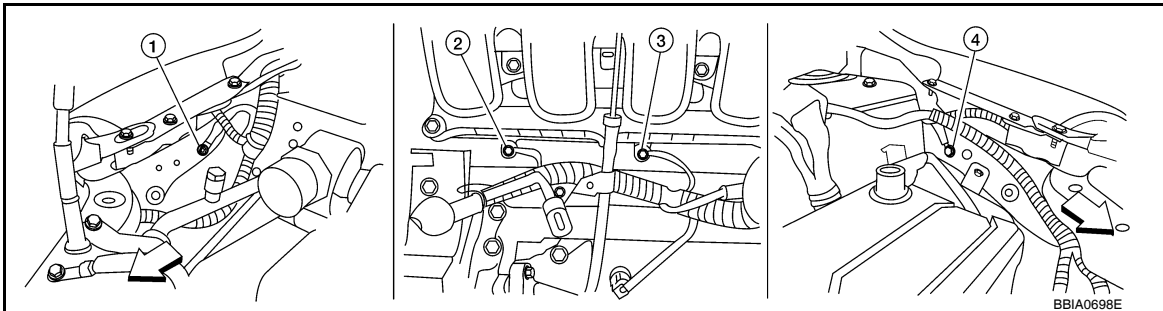
- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

OK or NG

- OK >> GO TO 3.
- NG >> Reconnect the parts.

3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
Refer to [EC-638. "Ground Inspection"](#).



DTC P0101 MAF SENSOR

[MR18DE]

< SERVICE INFORMATION >

↔ Vehicle front

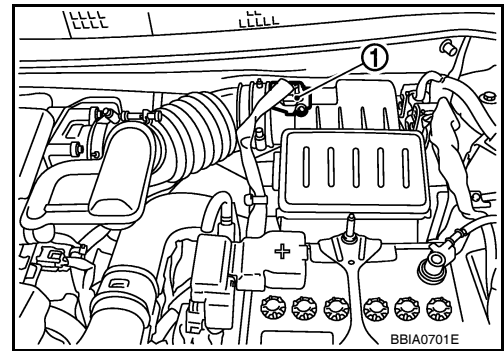
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

- OK >> GO TO 4.
NG >> Repair or replace ground connections.

4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor (1) harness connector.
2. Turn ignition switch ON.

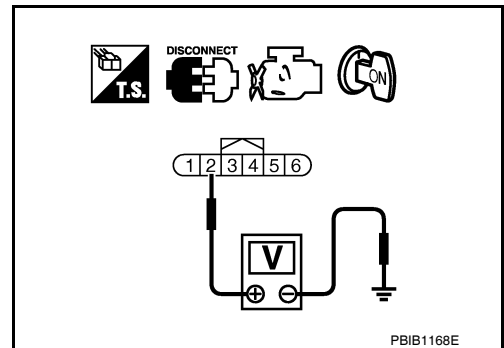


3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 6.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between mass air flow sensor and IPDM E/R
- Harness for open or short between mass air flow sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 52.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 45.
Refer to Wiring Diagram.

DTC P0101 MAF SENSOR

< SERVICE INFORMATION >

[MR18DE]

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short or short to power in harness or connectors.

8. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to [EC-682, "Component Inspection"](#).

OK or NG

OK >> GO TO 9.

NG >> Replace intake air temperature sensor.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-850, "Component Inspection"](#).

OK or NG

OK >> GO TO 10.

NG >> Replace EVAP control system pressure sensor.

10. CHECK MASS AIR FLOW SENSOR

Refer to [EC-670, "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> Replace mass air flow sensor.

11. CHECK INTERMITTENT INCIDENT

Perform [EC-632](#).

>> INSPECTION END

Component Inspection

INFOID:000000005532486

MASS AIR FLOW SENSOR

Ⓟ With CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-III and select "DATA MONITOR" mode.
4. Select "MAS A/F SE-B1" and check indication under the following conditions.

Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 1.8
Idle to about 4,000 rpm	0.9 - 1.2 to 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

5. If the voltage is out of specification, proceed the following.
 - a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
 - Crushed air ducts
 - Malfunctioning seal of air cleaner element
 - Uneven dirt of air cleaner element
 - Improper specification of intake air system parts

DTC P0101 MAF SENSOR

[MR18DE]

< SERVICE INFORMATION >

- b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
If OK, go to next step.
6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

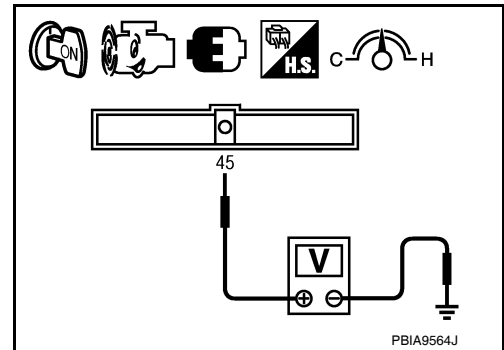
⊗ Without CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 45 (Mass air flow sensor signal) and ground.

Condition	Voltage (V)
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 1.8
Idle to about 4,000 rpm	0.9 - 1.2 to 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, proceed the following.
 - a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
 - Crushed air ducts
 - Malfunctioning seal of air cleaner element
 - Uneven dirt of air cleaner element
 - Improper specification of intake air system parts
 - b. If NG, repair or replace malfunctioning part and perform step 2 and 3 again.
If OK, go to next step.
5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.



Removal and Installation

INFOID:000000005532487

MASS AIR FLOW SENSOR

Refer to [EM-135. "Removal and Installation"](#).

DTC P0102, P0103 MAF SENSOR

< SERVICE INFORMATION >

[MR18DE]

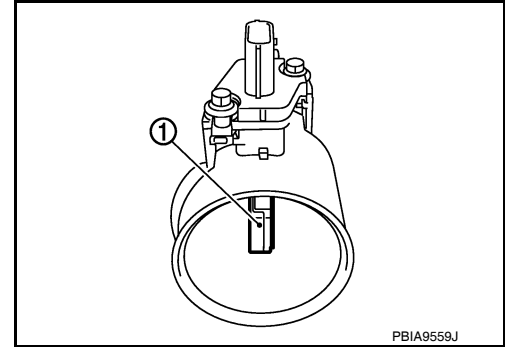
DTC P0102, P0103 MAF SENSOR

Component Description

INFOID:000000005532488

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532489

Specification data are reference values.

Monitor item	Condition	Specification
MAS A/F SE-B1	• See EC-624 .	
CAL/LD VALUE	• Engine: After warming up • Shift lever: P or N (A/T, CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle 10% - 35%
		2,500 rpm 10% - 35%
MASS AIRFLOW	• Engine: After warming up • Shift lever: P or N (A/T, CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle 1.0 - 4.0 g·m/s
		2,500 rpm 4.0 - 10.0 g·m/s

On Board Diagnosis Logic

INFOID:000000005532490

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
P0103 0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Mass air flow sensor

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

INFOID:000000005532491

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

DTC P0102, P0103 MAF SENSOR

[MR18DE]

< SERVICE INFORMATION >

PROCEDURE FOR DTC P0102

1. Start engine and wait at least 5 seconds.
2. Check DTC.
3. If DTC is detected, go to [EC-675. "Diagnosis Procedure"](#).

A

PROCEDURE FOR DTC P0103

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.
3. If DTC is detected, go to [EC-675. "Diagnosis Procedure"](#).
If DTC is not detected, go to next step.
4. Start engine and wait at least 5 seconds.
5. Check DTC.
6. If DTC is detected, go to [EC-675. "Diagnosis Procedure"](#).

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

DTC P0102, P0103 MAF SENSOR

< SERVICE INFORMATION >

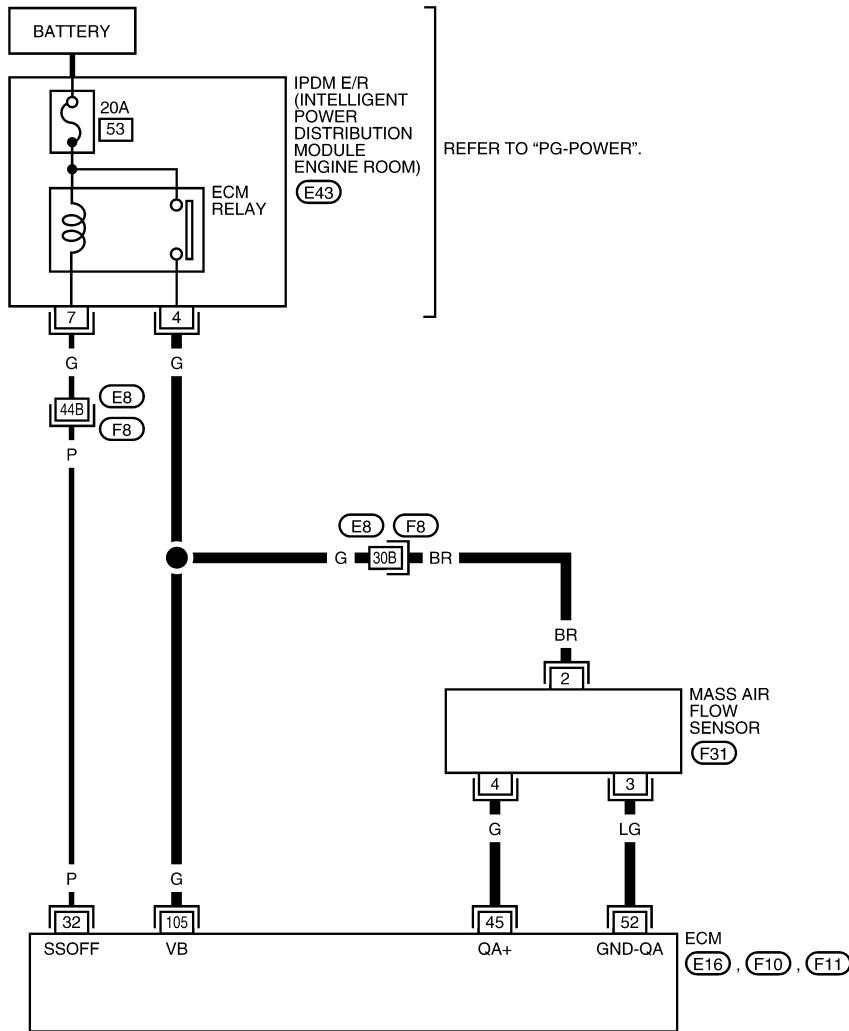
[MR18DE]

Wiring Diagram

INFOID:000000005532492

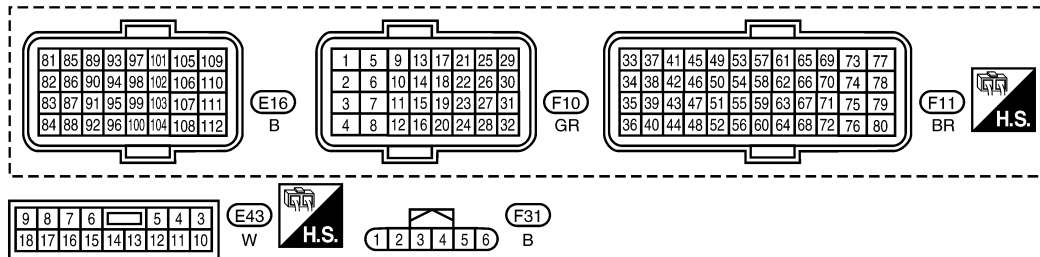
EC-MAFS-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

(F8) - SUPER MULTIPLE JUNCTION (SMJ)



BBWA2632E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0102, P0103 MAF SENSOR

< SERVICE INFORMATION >

[MR18DE]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	P	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.0 V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
45	G	Mass air flow sensor	[Engine is running] • Warm-up condition • Idle speed	0.9 - 1.2 V
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	1.5 - 1.8 V
52	LG	Sensor ground (Mass air flow sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
105	G	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

Diagnosis Procedure

INFOID:000000005532493

1. INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

P0102 or P0103

P0102 >> GO TO 2.

P0103 >> GO TO 3.

2. CHECK INTAKE SYSTEM

Check the following for connection.

- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

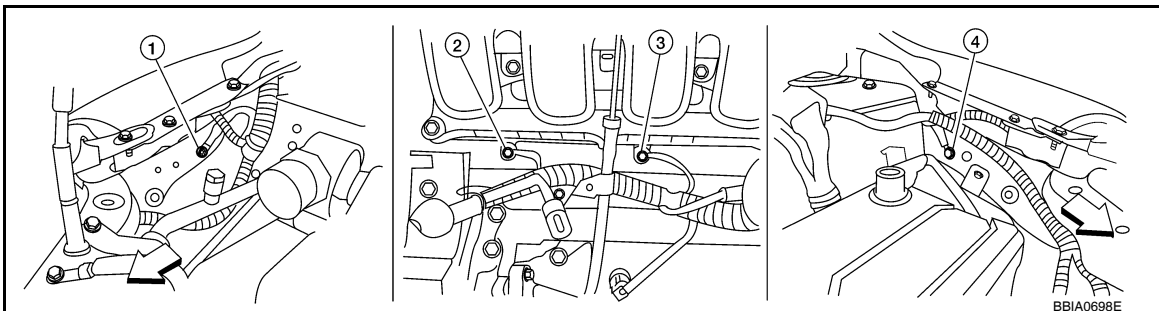
OK or NG

OK >> GO TO 3.

NG >> Reconnect the parts.

3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
Refer to [EC-638, "Ground Inspection"](#).



DTC P0102, P0103 MAF SENSOR

[MR18DE]

< SERVICE INFORMATION >

↶ Vehicle front

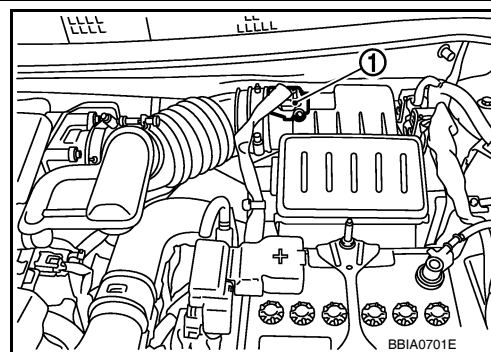
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

- OK >> GO TO 4.
NG >> Repair or replace ground connections.

4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor (1) harness connector.
2. Turn ignition switch ON.

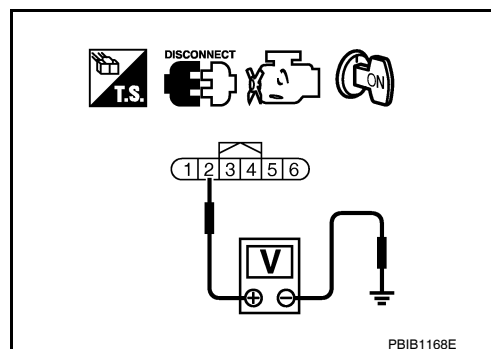


3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 6.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 52.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 45.
Refer to Wiring Diagram.

DTC P0102, P0103 MAF SENSOR

< SERVICE INFORMATION >

[MR18DE]

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR

Refer to [EC-677, "Component Inspection"](#).

OK or NG

OK >> GO TO 9.

NG >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> INSPECTION END

Component Inspection

INFOID:000000005532494

MASS AIR FLOW SENSOR

With CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-III and select "DATA MONITOR" mode.
4. Select "MAS A/F SE-B1" and check indication under the following conditions.

Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 1.8
Idle to about 4,000 rpm	0.9 - 1.2 to 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

5. If the voltage is out of specification, proceed the following.
 - a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
 - Crushed air ducts
 - Malfunctioning seal of air cleaner element
 - Uneven dirt of air cleaner element
 - Improper specification of intake air system parts
 - b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
If OK, go to next step.
6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

Without CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.

DTC P0102, P0103 MAF SENSOR

[MR18DE]

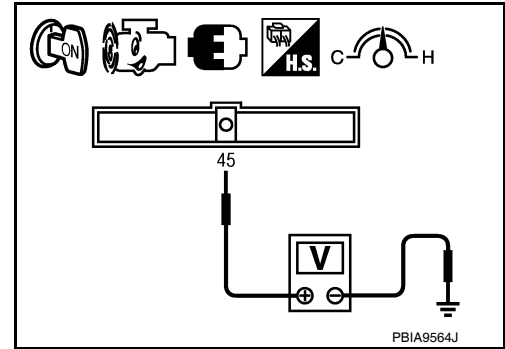
< SERVICE INFORMATION >

3. Check voltage between ECM terminal 45 (Mass air flow sensor signal) and ground.

Condition	Voltage (V)
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 1.8
Idle to about 4,000 rpm	0.9 - 1.2 to 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, proceed the following.
- Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
 - Crushed air ducts
 - Malfunctioning seal of air cleaner element
 - Uneven dirt of air cleaner element
 - Improper specification of intake air system parts
 - If NG, repair or replace malfunctioning part and perform step 2 and 3 again. If OK, go to next step.
5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.



Removal and Installation

INFOID:000000005532495

MASS AIR FLOW SENSOR

Refer to [EM-135, "Removal and Installation"](#).

DTC P0112, P0113 IAT SENSOR

< SERVICE INFORMATION >

[MR18DE]

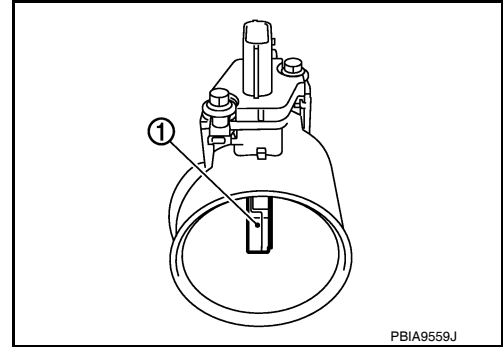
DTC P0112, P0113 IAT SENSOR

Component Description

INFOID:000000005532496

The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



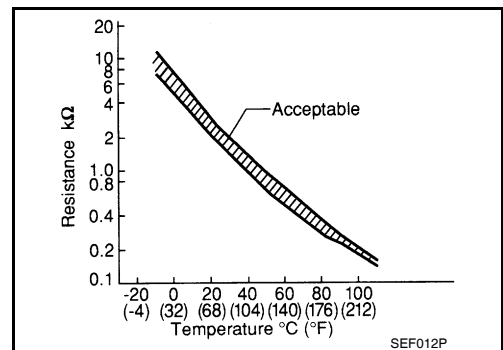
<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

*: This data is reference value and is measured between ECM terminal 46 (Intake air temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



On Board Diagnosis Logic

INFOID:000000005532497

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112 0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (Intake air temperature sensor circuit is open or shorted.) • Intake air temperature sensor
P0113 0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

INFOID:000000005532498

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-680. "Diagnosis Procedure"](#).

DTC P0112, P0113 IAT SENSOR

< SERVICE INFORMATION >

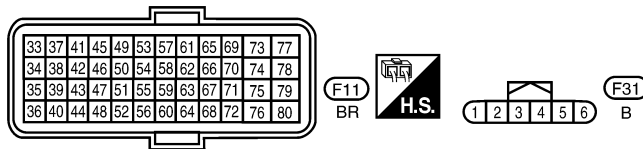
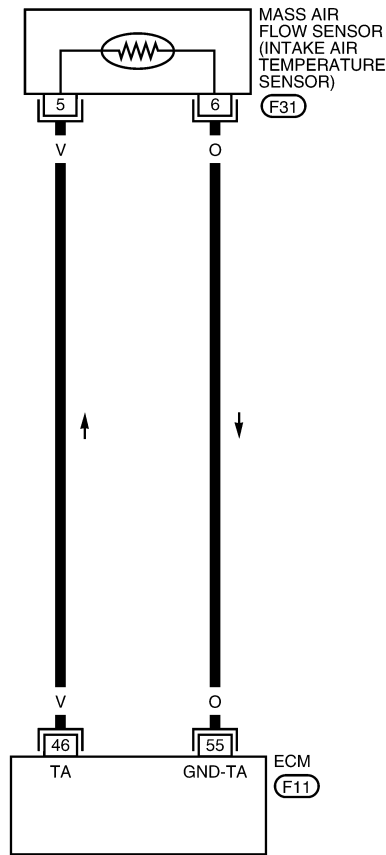
[MR18DE]

Wiring Diagram

INFOID:000000005532499

EC-IATS-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



BBWA2633E

Diagnosis Procedure

INFOID:000000005532500

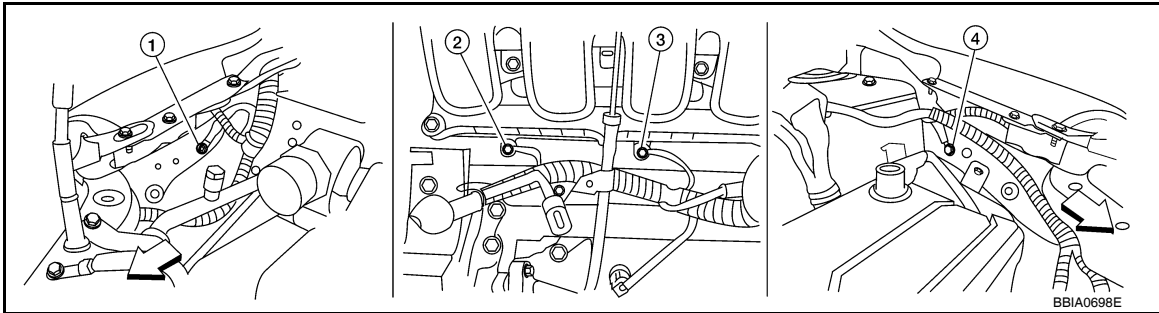
1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
 Refer to [EC-638, "Ground Inspection"](#).

DTC P0112, P0113 IAT SENSOR

< SERVICE INFORMATION >

[MR18DE]



⇐ Vehicle front

1. Body ground E24

2. Engine ground F9

3. Engine ground F16

4. Body ground E15

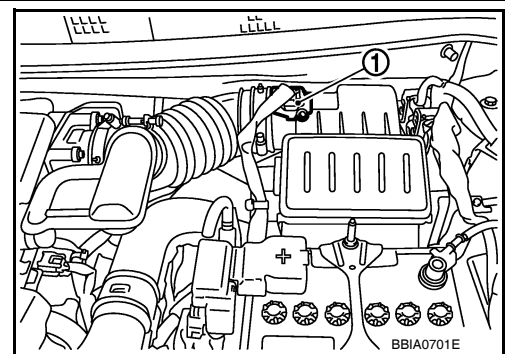
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (with intake air temperature sensor) (1) harness connector.
2. Turn ignition switch ON.



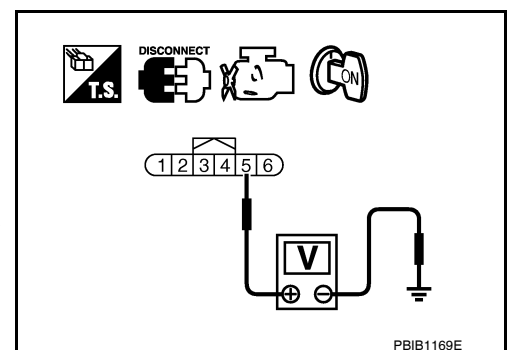
3. Check voltage between mass air flow sensor terminal 5 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V

OK or NG

OK >> GO TO 3.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 6 and ECM terminal 55. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

DTC P0112, P0113 IAT SENSOR

[MR18DE]

< SERVICE INFORMATION >

Refer to [EC-682. "Component Inspection"](#).

OK or NG

OK >> GO TO 5.

NG >> Replace mass air flow sensor (with intake air temperature sensor).

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

Component Inspection

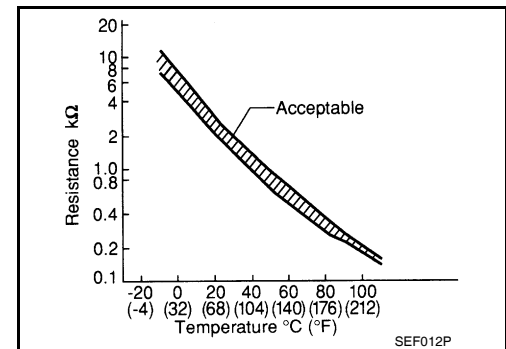
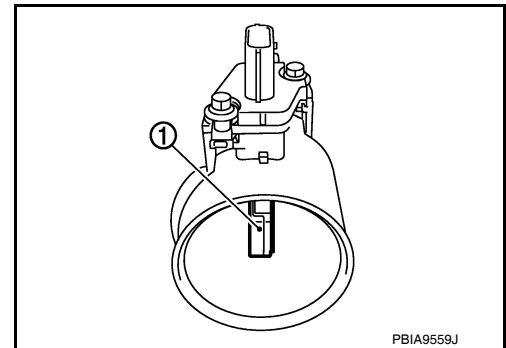
INFOID:000000005532501

INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor (1) terminals 5 and 6 under the following conditions.

Intake air temperature [°C (°F)]	Resistance (kΩ)
25 (77)	1.800 - 2.200

2. If NG, replace mass air flow sensor (with intake air temperature sensor).



Removal and Installation

INFOID:000000005532502

MASS AIR FLOW SENSOR

Refer to [EM-135. "Removal and Installation"](#).

DTC P0116 ECT SENSOR

< SERVICE INFORMATION >

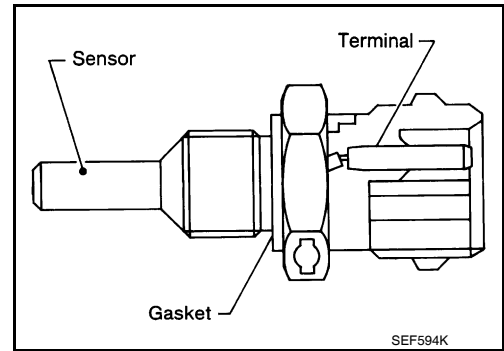
[MR18DE]

DTC P0116 ECT SENSOR

Component Description

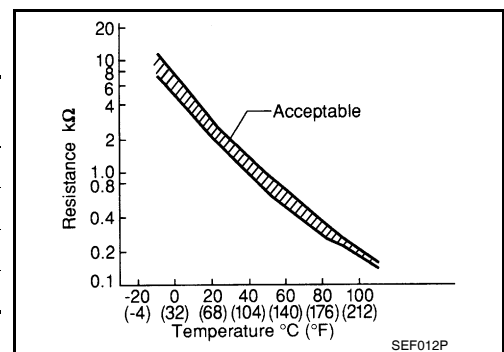
INFOID:000000005532503

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260



*: This data is reference value and is measured between ECM terminal 38 (Engine coolant temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

INFOID:000000005532504

NOTE:

If DTC P0116 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117, P0118. Refer to [EC-687, "DTC Confirmation Procedure"](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0116 0116	Engine coolant temperature sensor circuit range/performance	Engine coolant temperature signal from engine coolant temperature sensor does not fluctuate, even when some time has passed after starting the engine with pre-warming up condition.	<ul style="list-style-type: none"> • Harness or connectors (High or low resistance in the circuit) • Engine coolant temperature sensor

DTC Confirmation Procedure

INFOID:000000005532505

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, do not add fuel.

1. Start engine and warm it up to normal operating temperature.
2. Rev engine up to 2,000 rpm for more than 10 minutes.
3. Move the vehicle to a cool place, then stop engine and turn ignition switch OFF.
4. Check resistance between "fuel level sensor unit and fuel pump" terminals 4 and 5.
5. Soak the vehicle until the resistance between "fuel level sensor unit and fuel pump" terminals 4 and 5 becomes 0.5 kΩ higher than the value measured before soaking.

CAUTION:

Never turn ignition switch ON during soaking time.

DTC P0116 ECT SENSOR

[MR18DE]

< SERVICE INFORMATION >

NOTE:

Soak time changes depending on ambient air temperature. It may take several hours.

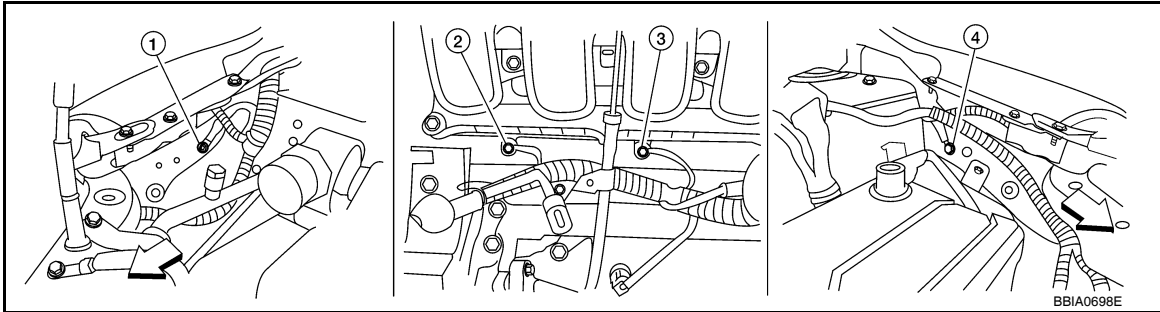
6. Start engine and let it idle for 20 minutes.
7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to [EC-684, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005532506

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
Refer to [EC-638, "Ground Inspection"](#).



↶ Vehicle front

1. Body ground E24
4. Body ground E15

2. Engine ground F9

3. Engine ground F16

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-684, "Component Inspection"](#).

OK or NG

- OK >> GO TO 3.
NG >> Replace engine coolant temperature sensor.

3. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

Refer to [EC-688, "Wiring Diagram"](#).

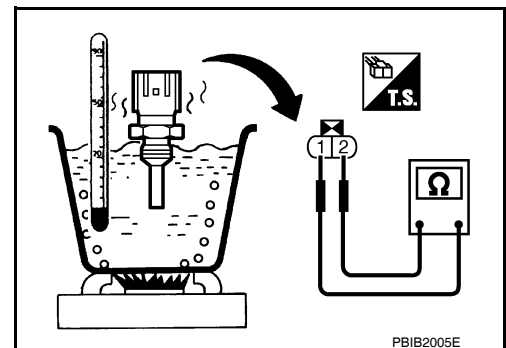
>> **INSPECTION END**

Component Inspection

INFOID:000000005532507

ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



DTC P0116 ECT SENSOR

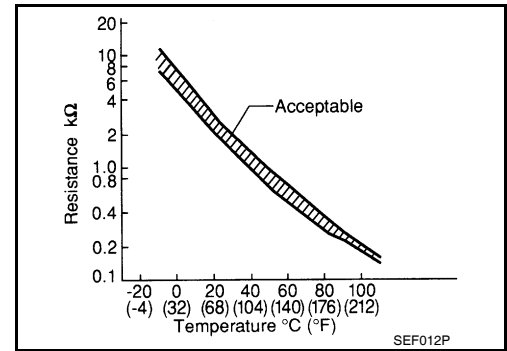
< SERVICE INFORMATION >

[MR18DE]

<Reference data>

Temperature [°C (°F)]	Resistance (kΩ)
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

2. If NG, replace engine coolant temperature sensor.



INFOID:000000005532508

Removal and Installation

ENGINE COOLANT TEMPERATURE SENSOR

Refer to [CO-48, "Component"](#).

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

DTC P0117, P0118 ECT SENSOR

< SERVICE INFORMATION >

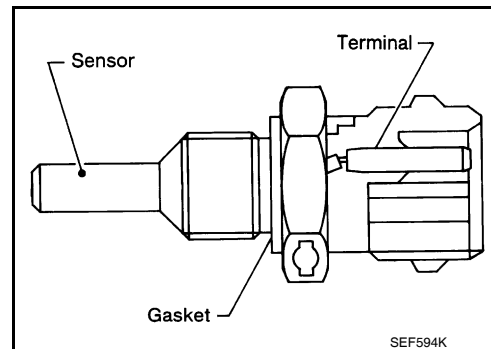
[MR18DE]

DTC P0117, P0118 ECT SENSOR

Component Description

INFOID:000000005532509

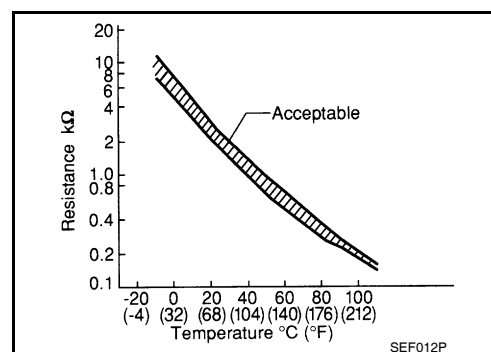
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: This data is reference value and is measured between ECM terminal 38 (Engine coolant temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

INFOID:000000005532510

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble Diagnosis Name	DTC detecting condition	Possible Cause
P0117 0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (Engine coolant temperature sensor circuit is open or shorted.) • Engine coolant temperature sensor
P0118 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

DTC P0117, P0118 ECT SENSOR

< SERVICE INFORMATION >

[MR18DE]

Detected items	Engine operating condition in fail-safe mode	
Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the following condition. CONSULT-III displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT-III display)
	Just as ignition switch is turned ON or START	40°C (104°F)
	Approx. 4 minutes or more after engine starting.	80°C (176°F)
	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.		

DTC Confirmation Procedure

INFOID:000000005532511

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.
3. If DTC is detected, go to [EC-688. "Diagnosis Procedure"](#).

DTC P0117, P0118 ECT SENSOR

[MR18DE]

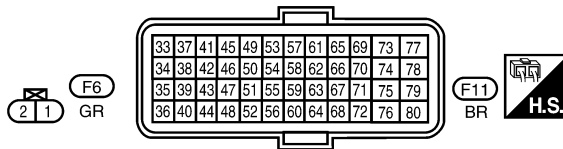
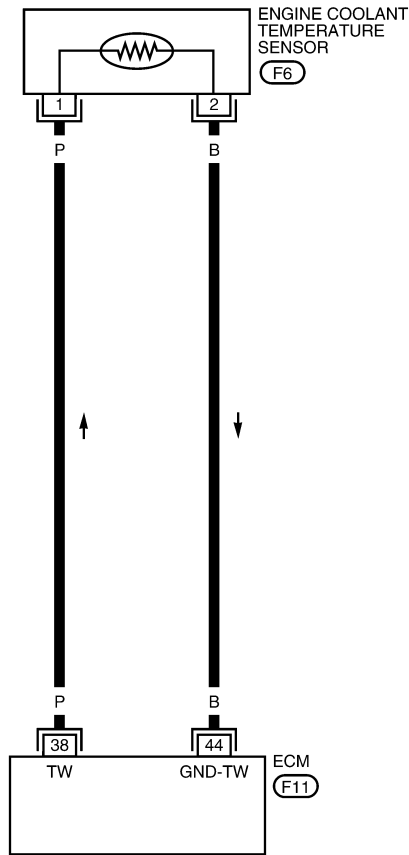
< SERVICE INFORMATION >

INFOID:000000005532512

Wiring Diagram

EC-ECTS-01

: DETECTABLE LINE FOR DTC
 : NON-DETECTABLE LINE FOR DTC



BBWA2634E

Diagnosis Procedure

INFOID:000000005532513

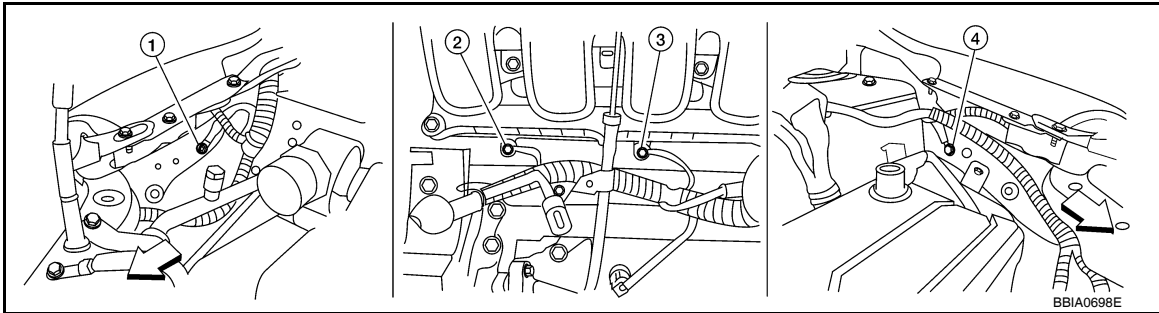
1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
Refer to [EC-638, "Ground Inspection"](#).

DTC P0117, P0118 ECT SENSOR

< SERVICE INFORMATION >

[MR18DE]



⇐: Vehicle front

1. Body ground E24

2. Engine ground F9

3. Engine ground F16

4. Body ground E15

OK or NG

OK >> GO TO 2.

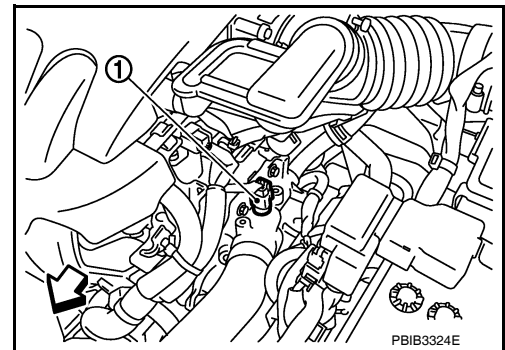
NG >> Repair or replace ground connections.

2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor (1) harness connector.

- ⇐: Vehicle front

2. Turn ignition switch ON.



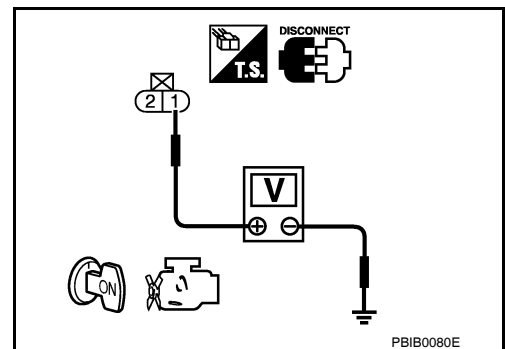
3. Check voltage between ECT sensor terminal 1 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V

OK or NG

OK >> GO TO 3.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check harness continuity between ECM terminal 44 and ECT sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

DTC P0117, P0118 ECT SENSOR

[MR18DE]

< SERVICE INFORMATION >

Refer to [EC-684, "Component Inspection"](#).

OK or NG

OK >> GO TO 5.

NG >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

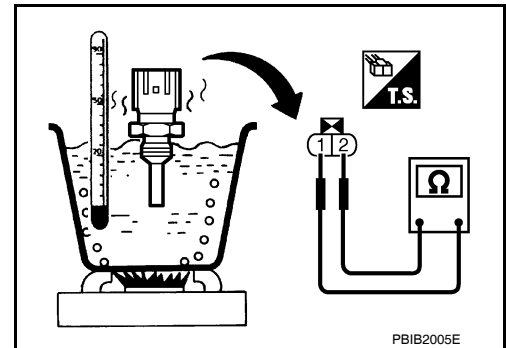
>> INSPECTION END

Component Inspection

INFOID:000000005532514

ENGINE COOLANT TEMPERATURE SENSOR

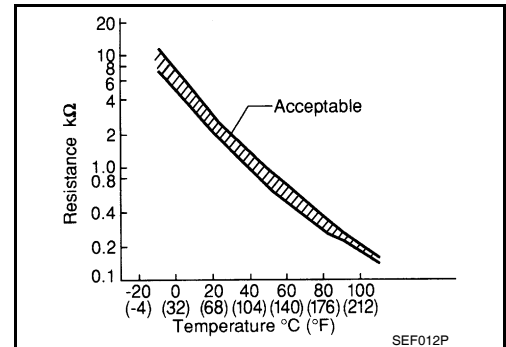
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Temperature [°C (°F)]	Resistance (kΩ)
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

2. If NG, replace engine coolant temperature sensor.



Removal and Installation

INFOID:000000005532515

ENGINE COOLANT TEMPERATURE SENSOR

Refer to [CO-48, "Component"](#).

DTC P0122, P0123 TP SENSOR

< SERVICE INFORMATION >

[MR18DE]

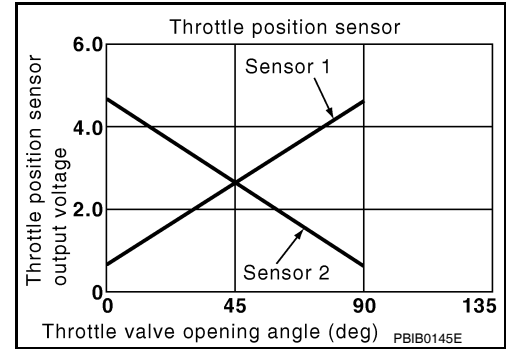
DTC P0122, P0123 TP SENSOR

Component Description

INFOID:000000005532516

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532517

Specification data are reference values.

Monitor item	Condition	Specification
TP SEN 1-B1 TP SEN 2-B1*	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released
	Shift lever: D (A/T, CVT), 1st (M/T)	Accelerator pedal: Fully depressed
		More than 0.36 V
		Less than 4.75 V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

INFOID:000000005532518

These self-diagnoses have the one trip detection logic.

NOTE:

If DTC P0122 or P0123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-896](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122 0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	<ul style="list-style-type: none"> Harness or connectors (TP sensor 2 circuit is open or shorted.) Electric throttle control actuator (TP sensor 2)
P0123 0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:000000005532519

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-693, "Diagnosis Procedure"](#).

DTC P0122, P0123 TP SENSOR

< SERVICE INFORMATION >

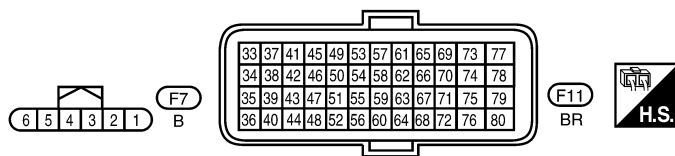
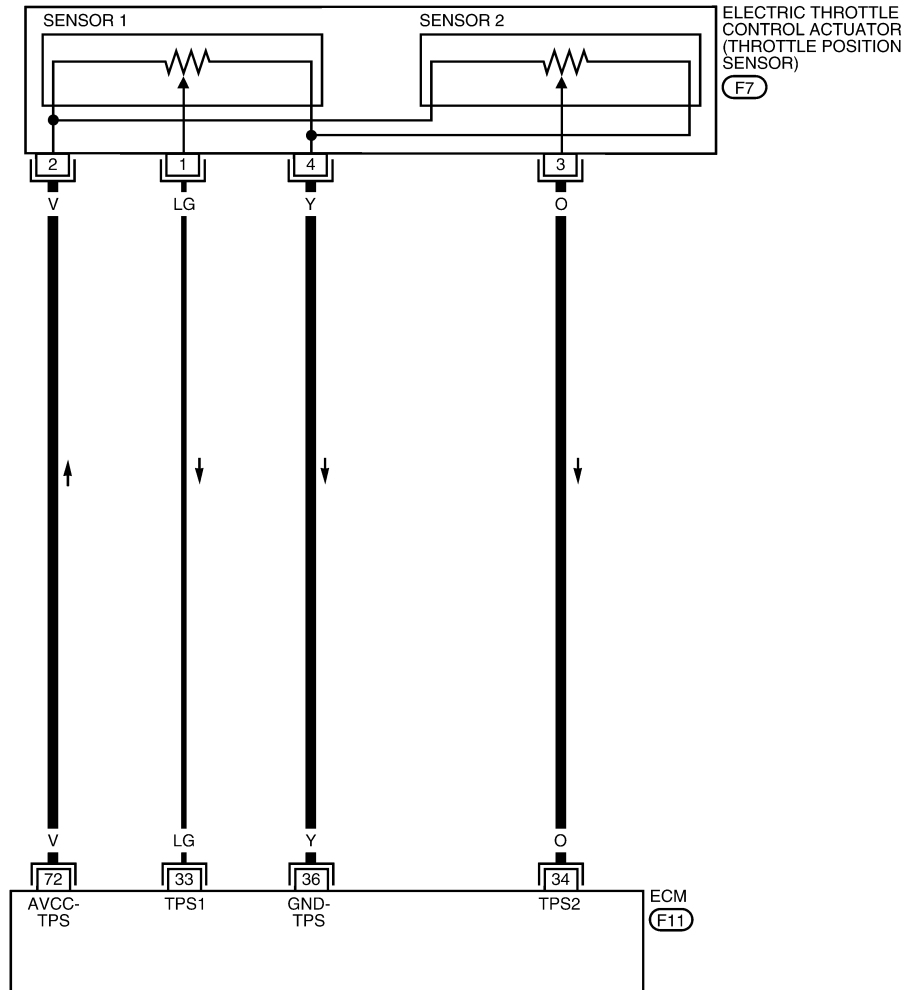
[MR18DE]

Wiring Diagram

INFOID:000000005532520

EC-TPS2-01

: DETECTABLE LINE FOR DTC
 : NON-DETECTABLE LINE FOR DTC



BBWA2656E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0122, P0123 TP SENSOR

< SERVICE INFORMATION >

[MR18DE]

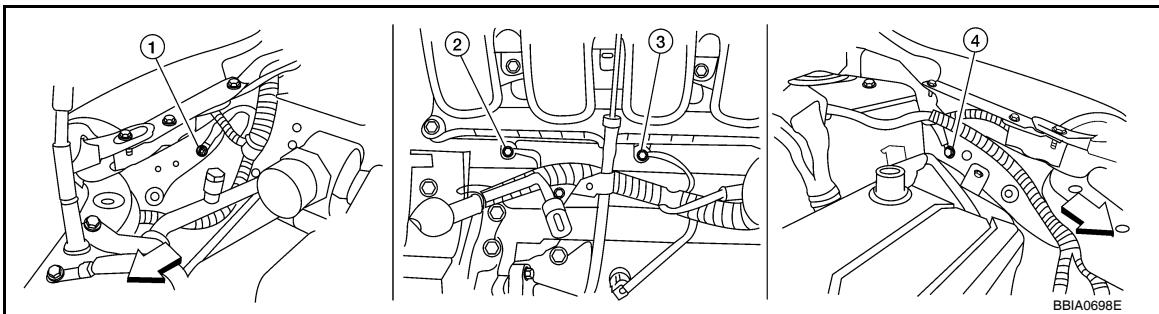
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	LG	Throttle position sensor 1	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36 V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75 V
34	O	Throttle position sensor 2	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75 V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36 V
36	Y	Sensor ground (Throttle position sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
72	V	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5 V

Diagnosis Procedure

INFOID:000000005532521

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
Refer to [EC-638](#), "Ground Inspection".



↔ Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground E16
4. Body ground E15

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

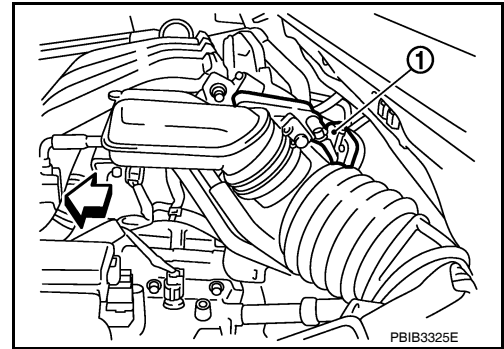
2. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

DTC P0122, P0123 TP SENSOR

[MR18DE]

< SERVICE INFORMATION >

1. Disconnect electric throttle control actuator (1) harness connector.
 - ⇐: Vehicle front
2. Turn ignition switch ON.

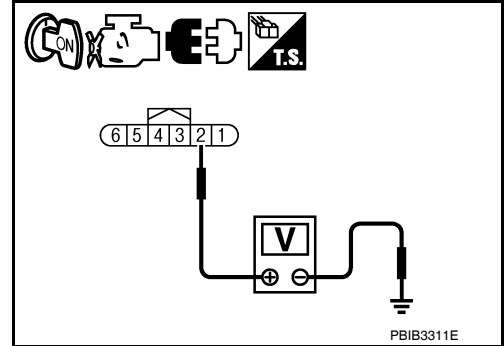


3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V

OK or NG

- OK >> GO TO 3.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 36. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 4.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 34 and electric throttle control actuator terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to [EC-695, "Component Inspection"](#).

OK or NG

- OK >> GO TO 7.
- NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-580, "Idle Air Volume Learning"](#).

DTC P0122, P0123 TP SENSOR

[MR18DE]

< SERVICE INFORMATION >

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> INSPECTION END

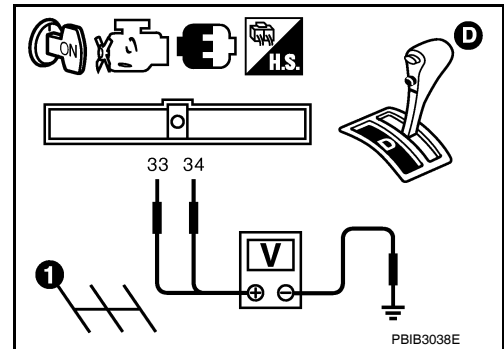
Component Inspection

INFOID:000000005532522

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
3. Turn ignition switch ON.
4. Set shift lever to D position (A/T, CVT) or 1st position (M/T).
5. Check voltage between ECM terminals 33 (TP sensor 1 signal), 34 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
33 (Throttle position sensor 1)	Fully released	More than 0.36 V
	Fully depressed	Less than 4.75 V
34 (Throttle position sensor 2)	Fully released	Less than 4.75 V
	Fully depressed	More than 0.36 V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
8. Perform [EC-580, "Idle Air Volume Learning"](#).

Removal and Installation

INFOID:000000005532523

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-137, "Removal and Installation"](#).

DTC P0125 ECT SENSOR

< SERVICE INFORMATION >

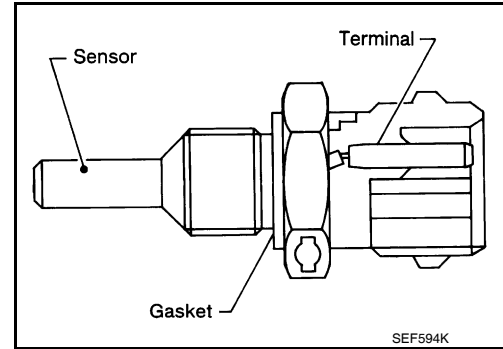
[MR18DE]

DTC P0125 ECT SENSOR

Component Description

INFOID:000000005532524

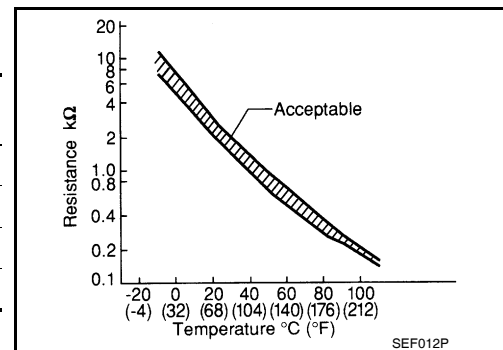
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: This data is reference value and is measured between ECM terminal 38 (Engine coolant temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

INFOID:000000005532525

NOTE:

- If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to [EC-687, "DTC Confirmation Procedure"](#).
- If DTC P0125 is displayed with P0116, first perform the trouble diagnosis for DTC P0116. Refer to [EC-696, "DTC Confirmation Procedure"](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0125 0125	Insufficient engine coolant temperature for closed loop fuel control	<ul style="list-style-type: none"> • Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. • Engine coolant temperature is insufficient for closed loop fuel control. 	<ul style="list-style-type: none"> • Harness or connectors (High resistance in the circuit) • Engine coolant temperature sensor • Thermostat

DTC Confirmation Procedure

INFOID:000000005532526

CAUTION:

Be careful not to overheat engine.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

④ WITH CONSULT-III

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-III.
3. Check that "COOLAN TEMP/S" is above 10°C (50°F).

DTC P0125 ECT SENSOR

[MR18DE]

< SERVICE INFORMATION >

If it is above 10°C (50°F), the test result will be OK.

If it is below 10°C (50°F), go to following step.

4. Start engine and run it for 65 minutes at idle speed.
If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.
5. Check DTC.
6. If DTC is detected, go to [EC-697. "Diagnosis Procedure"](#).

WITH GST

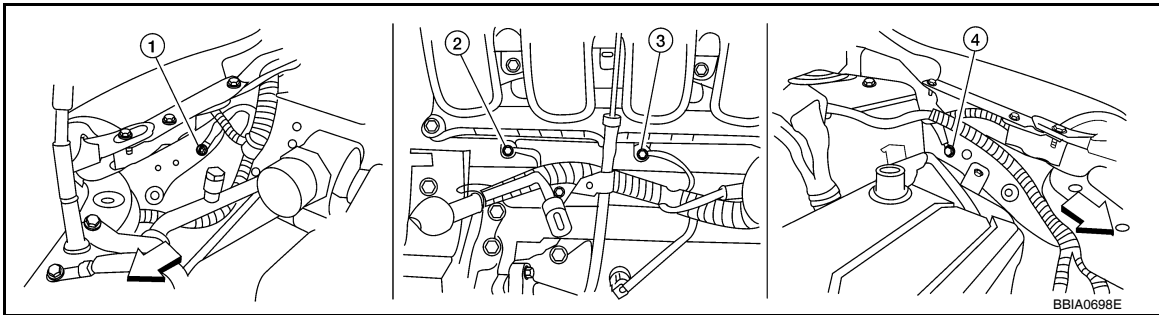
Follow the procedure "WITH CONSULT-III" above.

Diagnosis Procedure

INFOID:000000005532527

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
Refer to [EC-638. "Ground Inspection"](#).



 Vehicle front

1. Body ground E24
4. Body ground E15

2. Engine ground F9

3. Engine ground F16

OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-698. "Component Inspection"](#).

OK or NG

OK >> GO TO 3.

NG >> Replace engine coolant temperature sensor.

3. CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

OK or NG

OK >> GO TO 4.

NG >> Repair or replace thermostat. Refer to [CO-46. "Removal and Installation"](#).

4. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

Refer to [EC-688. "Wiring Diagram"](#).

>> INSPECTION END

DTC P0125 ECT SENSOR

< SERVICE INFORMATION >

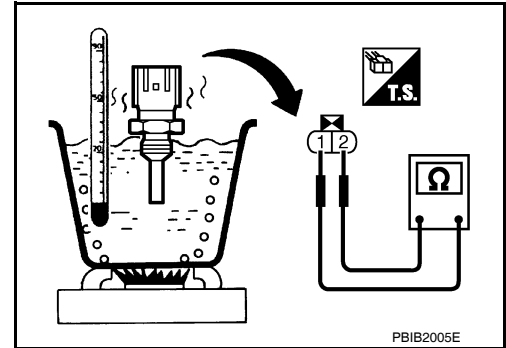
[MR18DE]

Component Inspection

INFOID:000000005532528

ENGINE COOLANT TEMPERATURE SENSOR

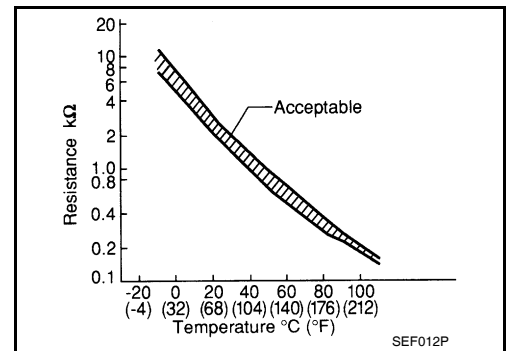
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Temperature [$^{\circ}$ C ($^{\circ}$ F)]	Resistance (k Ω)
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

2. If NG, replace engine coolant temperature sensor.



Removal and Installation

ENGINE COOLANT TEMPERATURE SENSOR

Refer to [CO-48. "Component"](#).

INFOID:000000005532529

DTC P0127 IAT SENSOR

< SERVICE INFORMATION >

[MR18DE]

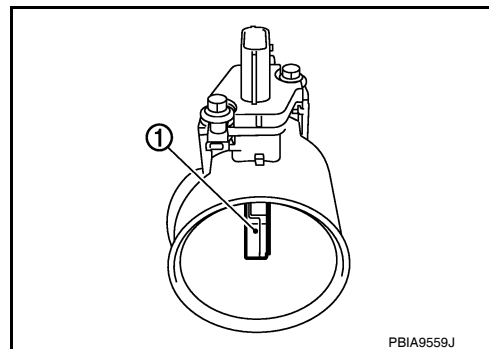
DTC P0127 IAT SENSOR

Component Description

INFOID:000000005532530

The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



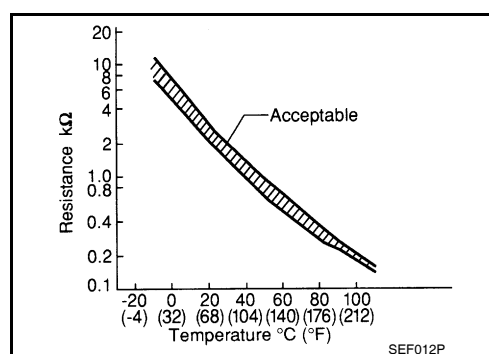
<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

*: This data is reference value and is measured between ECM terminal 46 (Intake air temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



On Board Diagnosis Logic

INFOID:000000005532531

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0127 0127	Intake air temperature too high	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	<ul style="list-style-type: none"> Harness or connectors (Intake temperature sensor circuit is open or shorted) Intake air temperature sensor

DTC Confirmation Procedure

INFOID:000000005532532

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Ⓟ WITH CONSULT-III

1. Wait until engine coolant temperature is less than 96°C (205°F)
 - a. Turn ignition switch ON.
 - b. Select "DATA MONITOR" mode with CONSULT-III.
 - c. Check the engine coolant temperature.
 - d. If the engine coolant temperature is not less than 96°C (205°F), turn ignition switch OFF and cool down engine.
 - Perform the following steps before engine coolant temperature is above 96°C (205°F).

DTC P0127 IAT SENSOR

[MR18DE]

< SERVICE INFORMATION >

2. Turn ignition switch ON.
3. Select "DATA MONITOR" mode with CONSULT-III.
4. Start engine.
5. Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.
6. Check 1st trip DTC.
7. If 1st trip DTC is detected, go to [EC-700. "Diagnosis Procedure"](#).

WITH GST

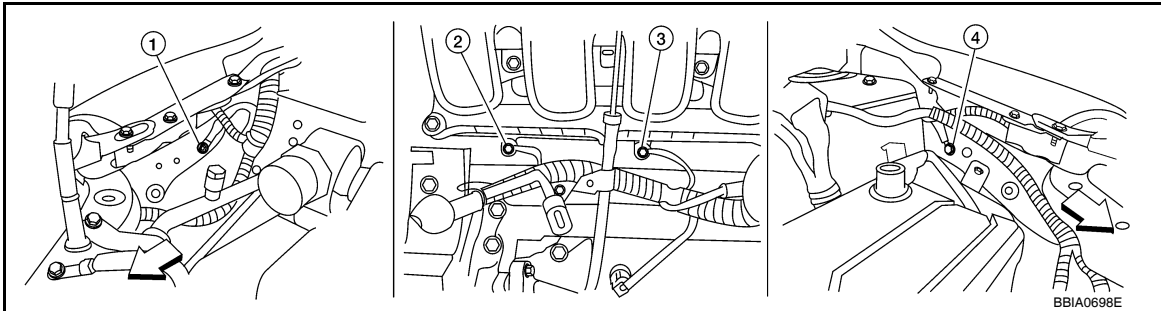
Follow the procedure "With CONSULT-III" above.

Diagnosis Procedure

INFOID:000000005532533

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
Refer to [EC-638. "Ground Inspection"](#).



 Vehicle front

1. Body ground E24
4. Body ground E15

2. Engine ground F9

3. Engine ground F16

OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to [EC-700. "Component Inspection"](#).

OK or NG

OK >> GO TO 3.

NG >> Replace mass air flow sensor (with intake air temperature sensor).

3. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

Refer to [EC-680. "Wiring Diagram"](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005532534

INTAKE AIR TEMPERATURE SENSOR

DTC P0127 IAT SENSOR

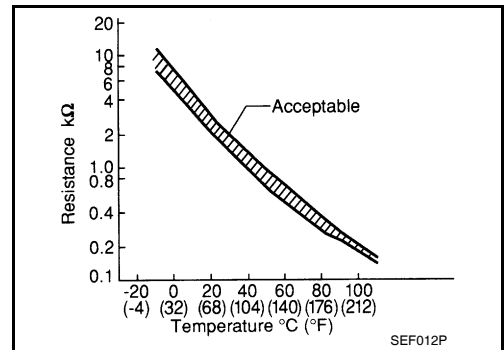
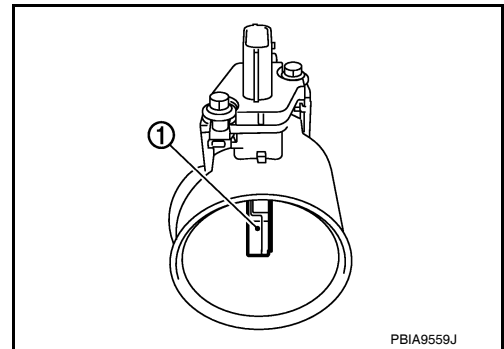
[MR18DE]

< SERVICE INFORMATION >

1. Check resistance between mass air flow sensor (1) terminals 5 and 6 under the following conditions.

Intake air temperature [°C (°F)]	Resistance (kΩ)
25 (77)	1.800 - 2.200

2. If NG, replace mass air flow sensor (with intake air temperature sensor).



Removal and Installation

INFOID:000000005532535

MASS AIR FLOW SENSOR

Refer to [EM-135, "Removal and Installation"](#).

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

DTC P0128 THERMOSTAT FUNCTION

< SERVICE INFORMATION >

[MR18DE]

DTC P0128 THERMOSTAT FUNCTION

On Board Diagnosis Logic

INFOID:000000005532536

NOTE:

If DTC P0128 is displayed with DTC P0300, P0301, P0302, P0303 or P0304, first perform the trouble diagnosis for DTC P0300, P0301, P0302, P0303, P0304. Refer to [EC-783, "DTC Confirmation Procedure"](#).

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough. This is due to a leak in the seal or the thermostat stuck open.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0128 0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	<ul style="list-style-type: none">• Thermostat• Leakage from sealing portion of thermostat• Engine coolant temperature sensor

DTC Confirmation Procedure

INFOID:000000005532537

WITH CONSULT-III

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- For best results, perform at ambient temperature of -10°C (14°F) or higher.
- For best results, perform at engine coolant temperature of -10°C (14°F) to 53°C (127°F).
- Before performing the following procedure, do not fill with the fuel.

1. Turn A/C switch OFF.
2. Turn blower fan switch OFF.
3. Turn ignition switch ON.
4. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III.
5. Check the indication of "COOLAN TEMP/S".
If it is below 53°C (127°F), go to following step.
If it is above 53°C (127°F), cool down the engine to less than 53°C (127°F). Then go to next steps.
6. Start engine.
7. Drive vehicle for 10 consecutive minutes under the following conditions.

VHCL SPEED SE	More than 56 km/h (35 MPH)
---------------	----------------------------

If "COOLAN TEMP/S" increases to more than 75°C (167°F) within 10 minutes, turn ignition switch OFF because the test result will be OK.

8. Check 1st trip DTC.
9. If 1st trip DTC is detected, go to [EC-702, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "With CONSULT-III" above.

Diagnosis Procedure

INFOID:000000005532538

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-703, "Component Inspection"](#).

OK or NG

- OK >> GO TO 2.
- NG >> Replace engine coolant temperature sensor.

2. CHECK THERMOSTAT

DTC P0128 THERMOSTAT FUNCTION

[MR18DE]

< SERVICE INFORMATION >

Refer to [CO-46, "Removal and Installation"](#).

OK or NG

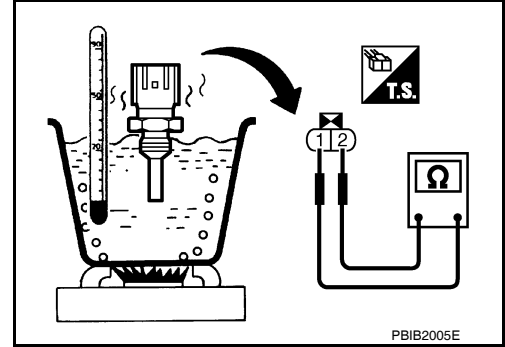
- OK >> **INSPECTION END**
- NG >> Replace thermostat.

Component Inspection

INFOID:000000005532539

ENGINE COOLANT TEMPERATURE SENSOR

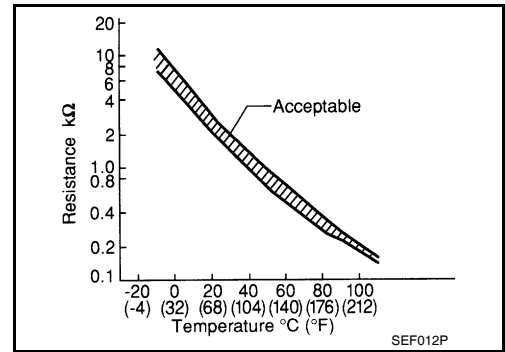
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature [°C (°F)]	Resistance (kΩ)
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

2. If NG, replace engine coolant temperature sensor.



Removal and Installation

INFOID:000000005532540

ENGINE COOLANT TEMPERATURE SENSOR

Refer to [CO-48, "Component"](#).

DTC P0130 A/F SENSOR 1

< SERVICE INFORMATION >

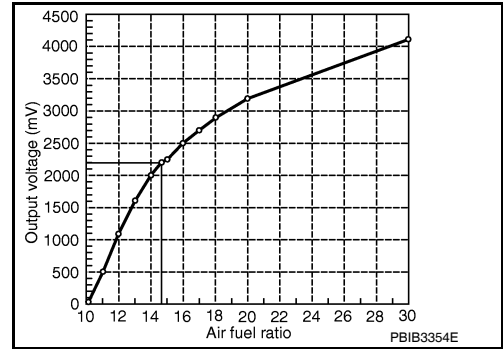
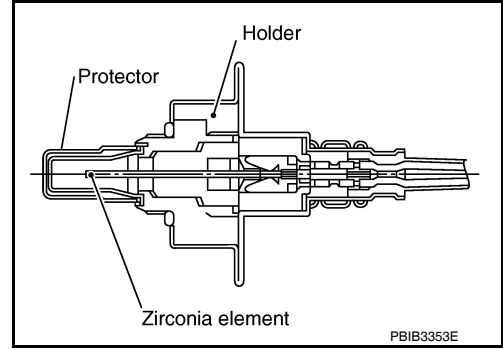
[MR18DE]

DTC P0130 A/F SENSOR 1

Component Description

INFOID:000000005532541

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element. The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range. The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich. Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532542

Specification data are reference values.

Monitor item	Condition		Specification
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V

On Board Diagnosis Logic

INFOID:000000005532543

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible Cause
P0130 0130	Air fuel ratio (A/F) sensor 1 circuit	A)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in the range other than approx. 2.2 V.	<ul style="list-style-type: none"> • Harness or connectors [Air fuel ratio (A/F) sensor 1 circuit is open or shorted.] • Air fuel ratio (A/F) sensor 1
		B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.	

DTC Confirmation Procedure

INFOID:000000005532544

Perform PROCEDURE FOR MALFUNCTION A first.

If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

PROCEDURE FOR MALFUNCTION A

1. Start engine and warm it up to normal operating temperature.

< SERVICE INFORMATION >

2. Let engine idle for 2 minutes.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to [EC-707. "Diagnosis Procedure"](#).

PROCEDURE FOR MALFUNCTION B

CAUTION:

Always drive vehicle at a safe speed.

 With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select "A/F SEN1 (B1)" in "DATA MONITOR" mode with CONSULT-III.
3. Check "A/F SEN1 (B1)" indication.
If the indication is constantly approx. 2.2 V and does not fluctuates, go to [EC-707. "Diagnosis Procedure"](#).
If the indication fluctuates around 2.2 V, go to next step.
4. Select "A/F SEN1 (B1) P1276" (for DTC P0130) of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III.
5. Touch "START".
6. When the following conditions are met, "TESTING" will be displayed on the CONSULT-III screen.

ENG SPEED	1,000 - 3,200 rpm (A/T, CVT) 1,350 - 3,200 rpm (M/T)
VHCL SPEED SE	More than 64 km/h (40 MPH)
B/FUEL SCHDL	1.0 - 8.0 msec
Shift lever	D position with OD OFF (A/T) D position (CVT) 5th position (M/T)

If "TESTING" is not displayed after 20 seconds, retry from step 2.

7. Release accelerator pedal fully.
NOTE:
Never apply brake during releasing the accelerator pedal.
8. Make sure that "TESTING" changes to "COMPLETED".
If "TESTING" changed to "OUT OF CONDITION", retry from step 6.
9. Make sure that "OK" is displayed after touching "SELF-DIAG RESULT".
If "NG" is displayed, go to [EC-707. "Diagnosis Procedure"](#).

Overall Function Check

INFOID:000000005532545

PROCEDURE MALFUNCTION B

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

 With GST

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
3. Set shift lever to D position with OD ON (A/T), D position (CVT) or 5th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).
NOTE:
Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 and 3 for five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 and 3 for five times.
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no 1st trip DTC is displayed.
If the 1st trip DTC is displayed, go to [EC-707. "Diagnosis Procedure"](#).

DTC P0130 A/F SENSOR 1

< SERVICE INFORMATION >

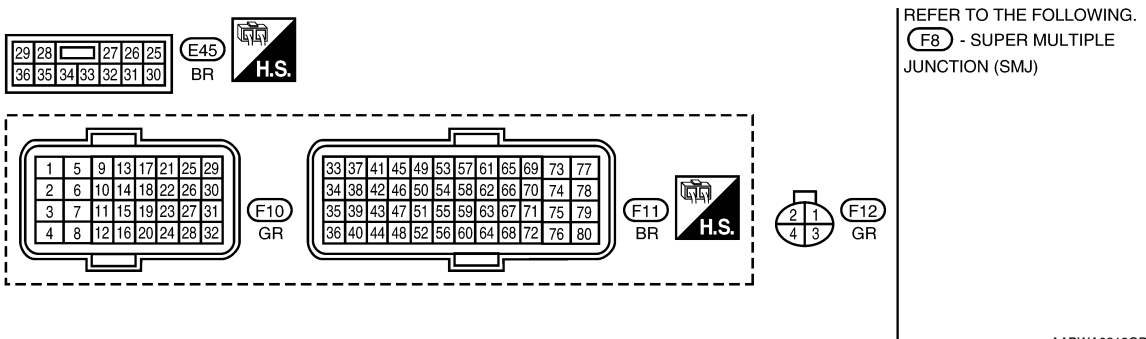
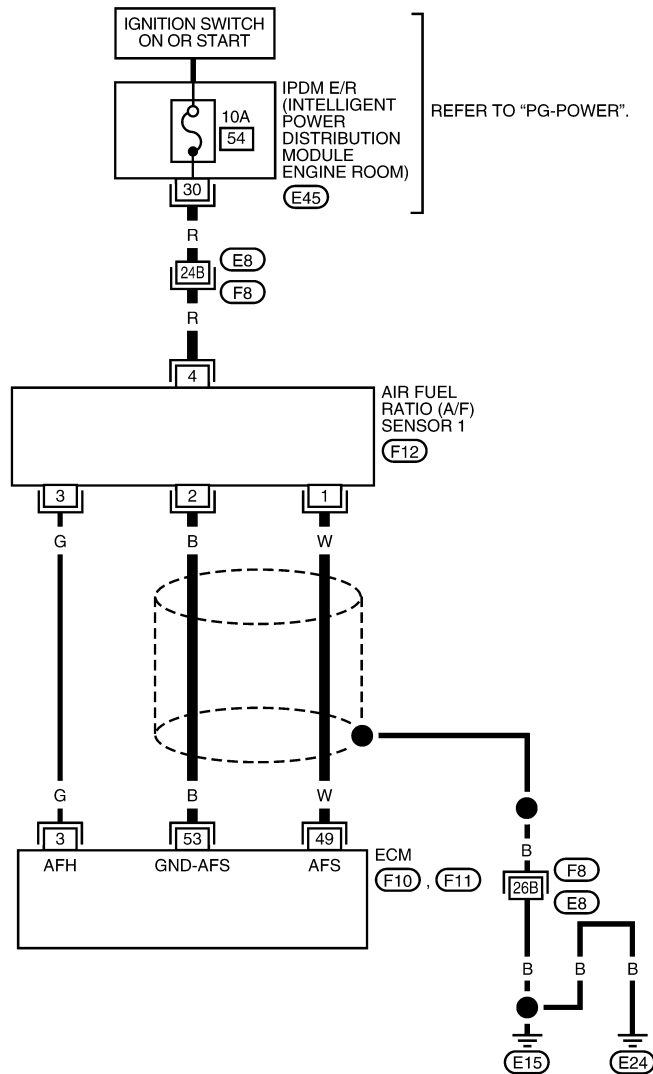
[MR18DE]

Wiring Diagram

INFOID:000000005532546

EC-A/F-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



AABWA0319GB

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

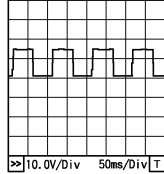
CAUTION:

DTC P0130 A/F SENSOR 1

< SERVICE INFORMATION >

[MR18DE]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8 V★  PBI A8148J
49	W	A/F sensor 1	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 1.8 V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	[Ignition switch: ON]	Approximately 2.2 V

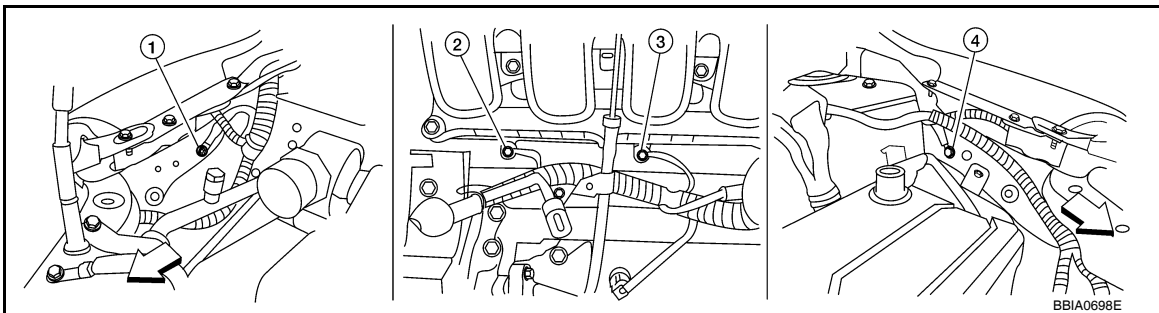
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005532547

1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten ground screw on the body.
Refer to [EC-638, "Ground Inspection"](#).



↔: Vehicle front

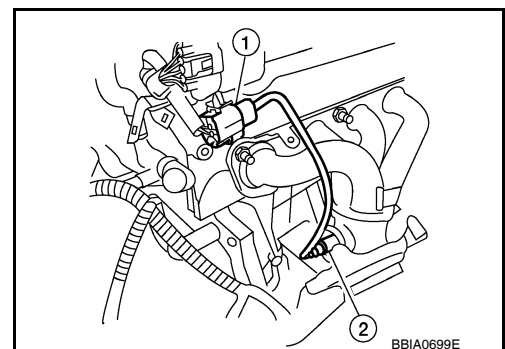
- Body ground E24
- Engine ground F9
- Engine ground F16
- Body ground E15

OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace ground connections.

2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- Disconnect A/F sensor 1 harness connector (1).
- Turn ignition switch ON.



DTC P0130 A/F SENSOR 1

[MR18DE]

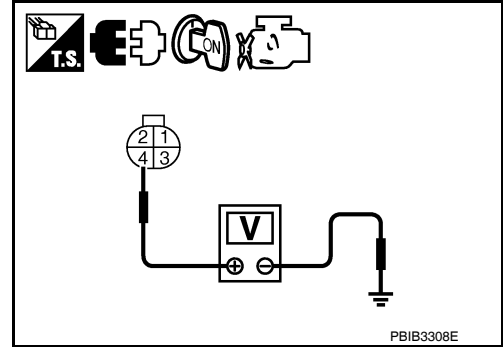
< SERVICE INFORMATION >

3. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

4. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

- OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform [EC-632](#).

OK or NG

- OK >> GO TO 6.
NG >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

DTC P0130 A/F SENSOR 1

< SERVICE INFORMATION >

[MR18DE]

Removal and Installation

INFOID:000000005532548

AIR FUEL RATIO SENSOR HEATER

Refer to [EM-140. "Removal and Installation"](#).

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

DTC P0131 A/F SENSOR 1

< SERVICE INFORMATION >

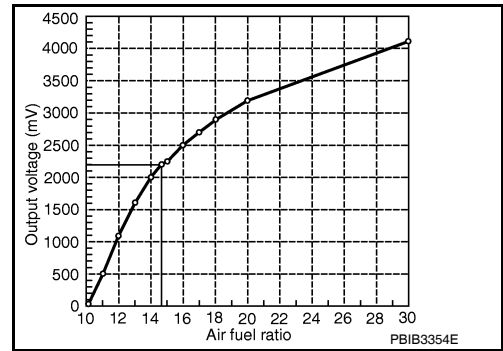
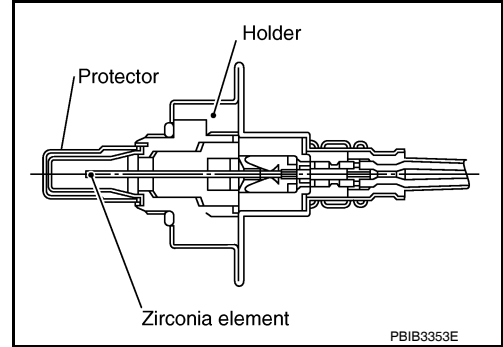
[MR18DE]

DTC P0131 A/F SENSOR 1

Component Description

INFOID:000000005532549

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element. The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range. The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich. Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532550

Specification data are reference values.

Monitor item	Condition	Specification
A/F SEN1 (B1)	<ul style="list-style-type: none"> Engine: After warming up Maintaining engine speed at 2,000 rpm 	Fluctuates around 2.2 V

On Board Diagnosis Logic

INFOID:000000005532551

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately low.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0131 0131	Air fuel ratio (A/F) sensor 1 circuit low voltage	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0 V.	<ul style="list-style-type: none"> Harness or connectors [Air fuel ratio (A/F) sensor circuit is open or shorted.] Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

INFOID:000000005532552

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

WITH CONSULT-III

- Start engine and warm it up to normal operating temperature.
- Select "A/F SEN1 (B1)" in "DATA MONITOR" mode with CONSULT-III.
- Check "A/F SEN1 (B1)" indication.
If the indication is constantly approx. 0 V, go to [EC-713. "Diagnosis Procedure"](#).

DTC P0131 A/F SENSOR 1

[MR18DE]

< SERVICE INFORMATION >

If the indication is not constantly approx. 0 V, go to next step.

4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 MPH)
B/FUEL SCHDL	1.5 - 9.0 msec
Shift lever	Suitable position

NOTE:

- Keep the accelerator pedal as steady as possible during the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.

7. Check 1st trip DTC.
8. If 1st trip DTC is displayed, go to [EC-713. "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT-III" above.

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

DTC P0131 A/F SENSOR 1

< SERVICE INFORMATION >

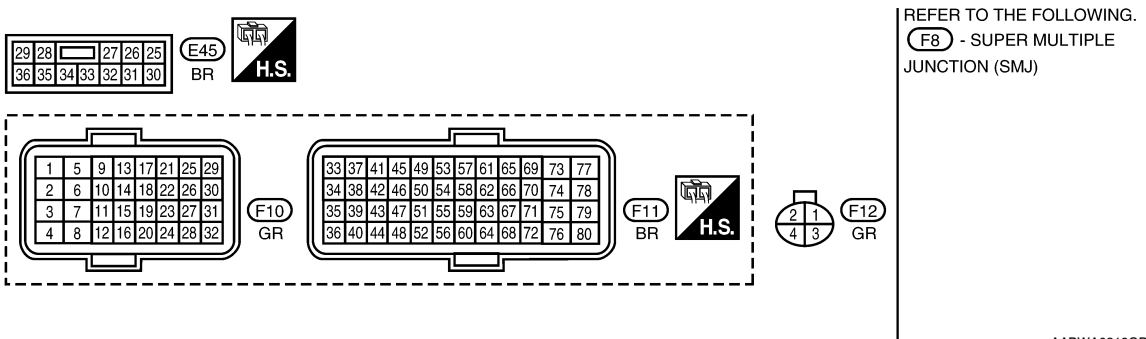
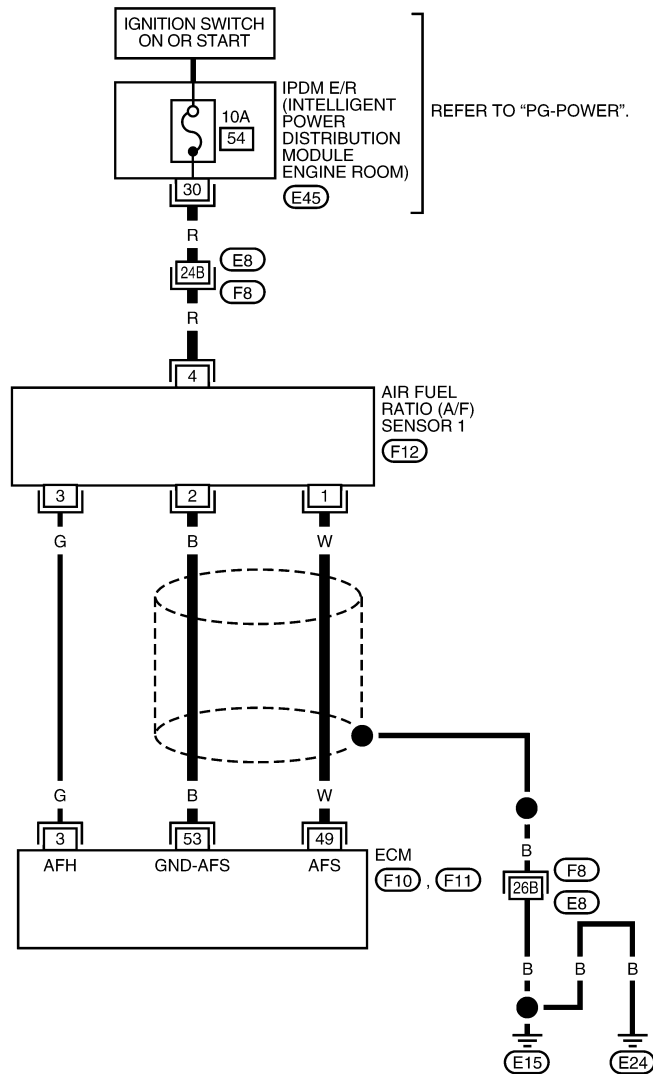
[MR18DE]

Wiring Diagram

INFOID:000000005532553

EC-A/F-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



AABWA0319GB

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

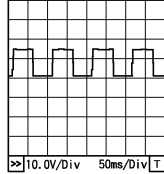
CAUTION:

DTC P0131 A/F SENSOR 1

< SERVICE INFORMATION >

[MR18DE]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8 V★  PBI A8148J
49	W	A/F sensor 1	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 1.8 V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	[Ignition switch: ON]	Approximately 2.2 V

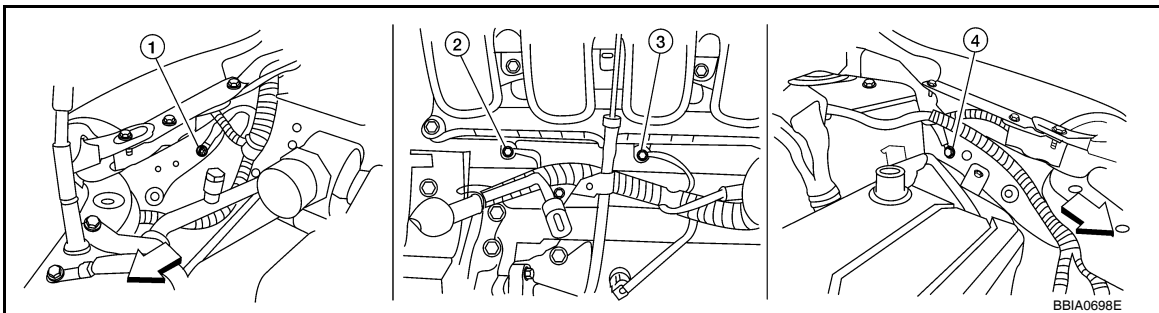
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005532554

1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten ground screw on the body.
Refer to [EC-638, "Ground Inspection"](#).



↔: Vehicle front

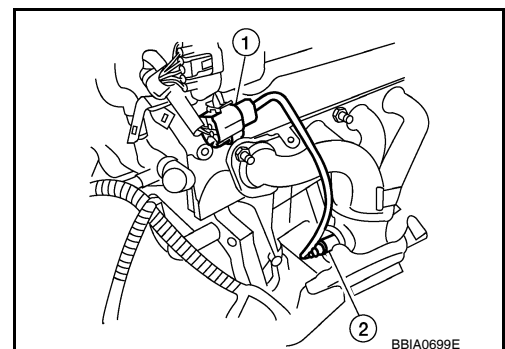
- Body ground E24
- Engine ground F9
- Engine ground F16
- Body ground E15

OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace ground connections.

2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- Disconnect A/F sensor 1 harness connector (1).
- Turn ignition switch ON.



DTC P0131 A/F SENSOR 1

[MR18DE]

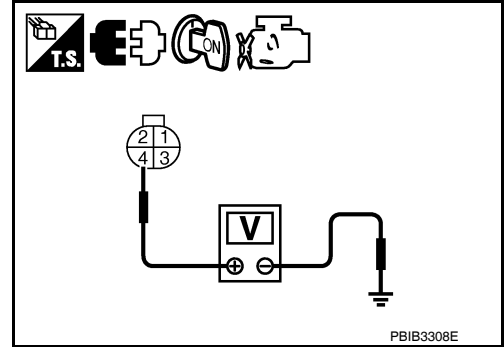
< SERVICE INFORMATION >

3. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
- NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

4. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

- OK >> GO TO 5.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform [EC-632](#).

OK or NG

- OK >> GO TO 6.
- NG >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

DTC P0131 A/F SENSOR 1

< SERVICE INFORMATION >

[MR18DE]

Removal and Installation

INFOID:000000005532555

AIR FUEL RATIO SENSOR HEATER

Refer to [EM-140. "Removal and Installation"](#).

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

DTC P0132 A/F SENSOR 1

< SERVICE INFORMATION >

[MR18DE]

DTC P0132 A/F SENSOR 1

Component Description

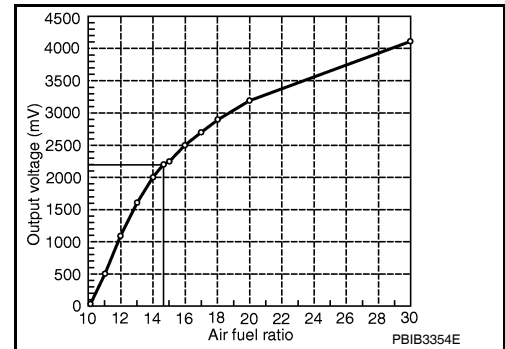
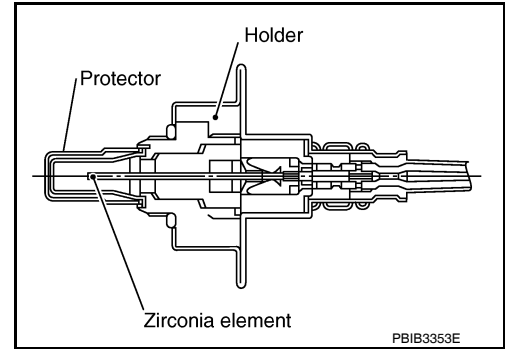
INFOID:000000005532556

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532557

Specification data are reference values.

Monitor item	Condition		Specification
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V

On Board Diagnosis Logic

INFOID:000000005532558

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately high.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132 0132	Air fuel ratio (A/F) sensor 1 circuit high voltage	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5 V.	<ul style="list-style-type: none"> • Harness or connectors [Air fuel ratio (A/F) sensor circuit is open or shorted.] • Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

INFOID:000000005532559

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select "A/F SEN1 (B1)" in "DATA MONITOR" mode with CONSULT-III.
3. Check "A/F SEN1 (B1)" indication.

If the indication is constantly approx. 5 V, go to [EC-719. "Diagnosis Procedure"](#).

DTC P0132 A/F SENSOR 1

[MR18DE]

< SERVICE INFORMATION >

If the indication is not constantly approx. 5 V, go to next step.

4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 MPH)
B/FUEL SCHDL	1.5 - 9.0 msec
Shift lever	Suitable position

NOTE:

- Keep the accelerator pedal as steady as possible during the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.

7. Check 1st trip DTC.
8. If 1st trip DTC is displayed, go to [EC-719. "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT-III" above.

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

DTC P0132 A/F SENSOR 1

< SERVICE INFORMATION >

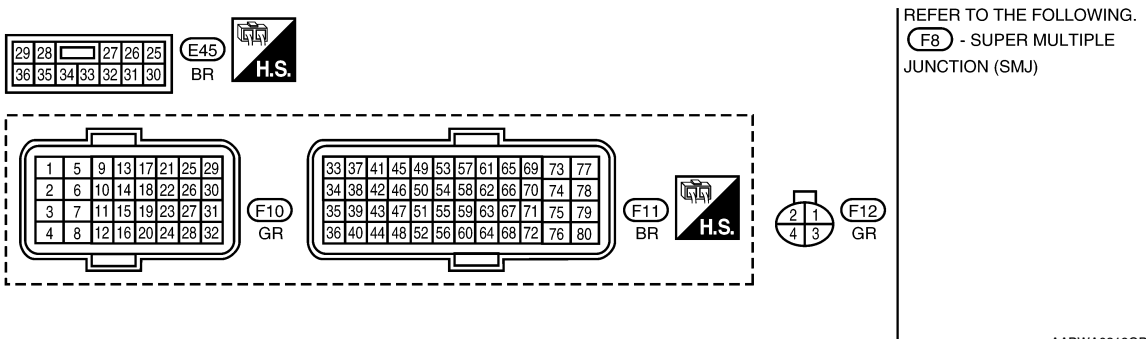
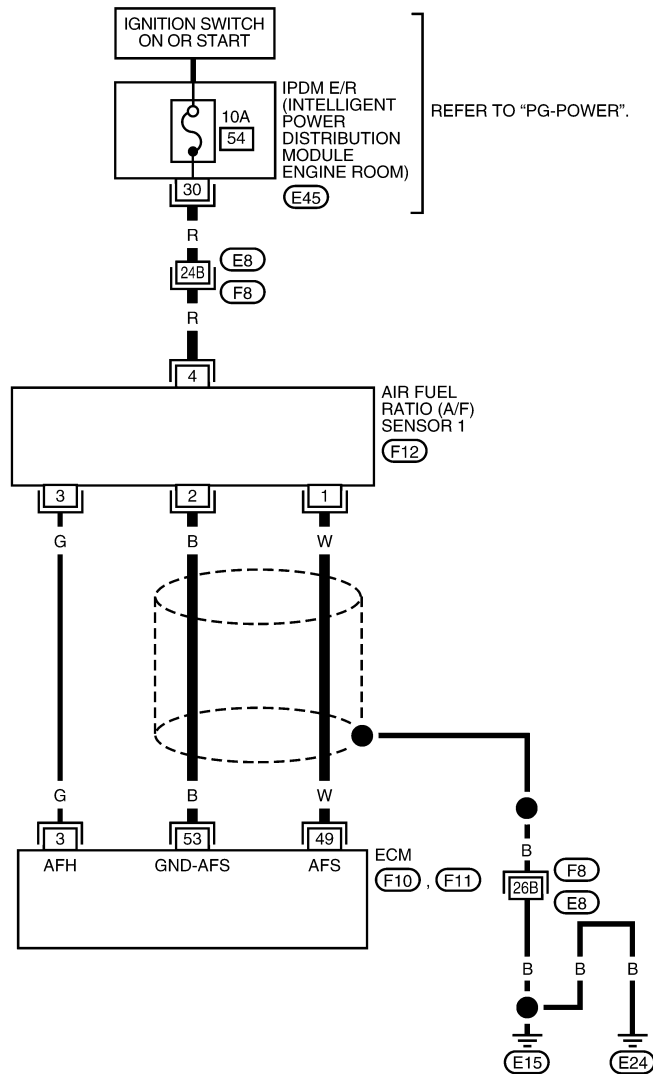
[MR18DE]

Wiring Diagram

INFOID:000000005532560

EC-A/F-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



AABWA0319GB

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

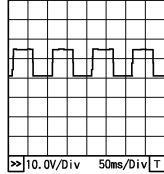
CAUTION:

DTC P0132 A/F SENSOR 1

< SERVICE INFORMATION >

[MR18DE]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8 V★  PBI A8148J
49	W	A/F sensor 1	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 1.8 V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	[Ignition switch: ON]	Approximately 2.2 V

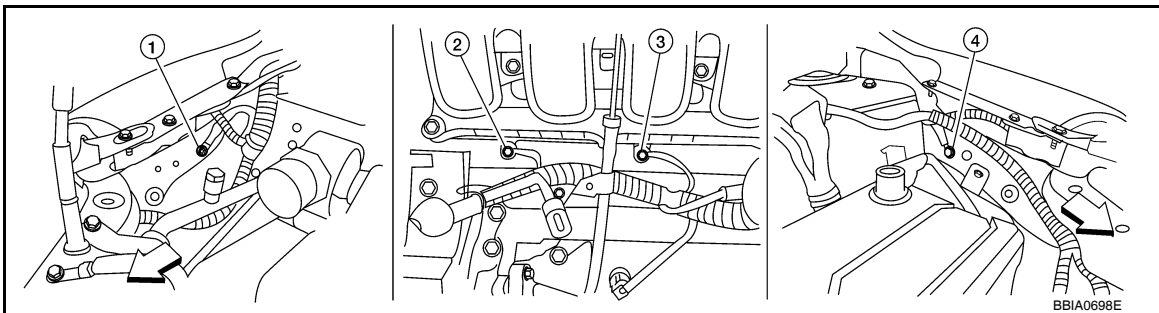
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005532561

1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body.
Refer to [EC-638, "Ground Inspection"](#).



↩: Vehicle front

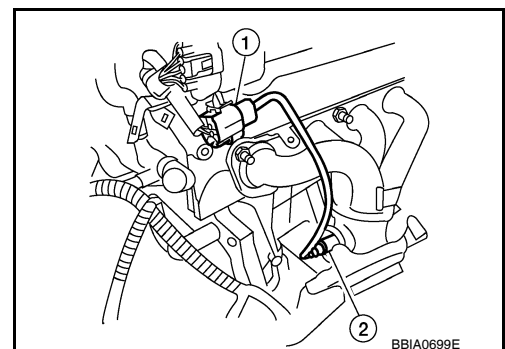
- Body ground E24
- Engine ground F9
- Engine ground F16
- Body ground E15

OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace ground connections.

2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- Disconnect A/F sensor 1 harness connector (1).
- Turn ignition switch ON.



DTC P0132 A/F SENSOR 1

[MR18DE]

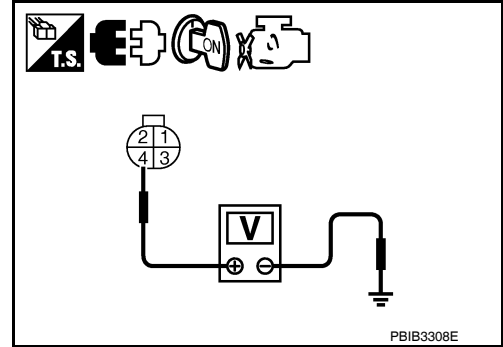
< SERVICE INFORMATION >

3. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
- NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

4. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

- OK >> GO TO 5.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform [EC-632](#).

OK or NG

- OK >> GO TO 6.
- NG >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

DTC P0132 A/F SENSOR 1

< SERVICE INFORMATION >

[MR18DE]

Removal and Installation

INFOID:000000005532562

AIR FUEL RATIO SENSOR HEATER

Refer to [EM-140. "Removal and Installation"](#).

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

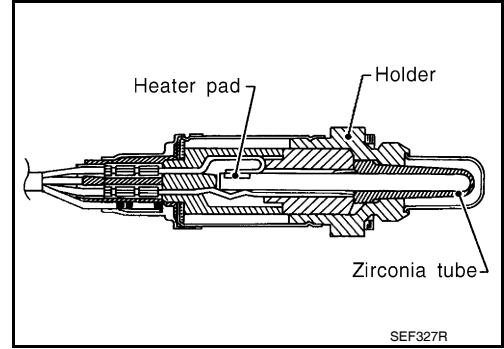
P

DTC P0137 HO2S2

Component Description

INFOID:000000005532570

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas. Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air/fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2. This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions. Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532571

Specification data are reference values.

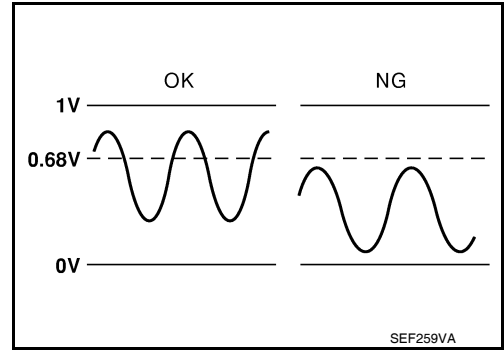
Monitor item	Condition	Specification
HO2S2 (B1)	<ul style="list-style-type: none"> • Revving engine from idle to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	0 - 0.3 V ↔ Approx. 0.6 - 1.0 V
HO2S2 MNTR (B1)		LEAN ↔ RICH

On Board Diagnosis Logic

INFOID:000000005532572

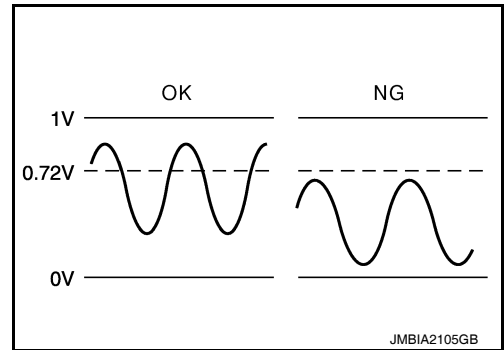
M/T MODELS AND A/T MODELS

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



CVT MODELS

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC P0137 HO2S2

< SERVICE INFORMATION >

[MR18DE]

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0137 0137	Heated oxygen sensor 2 circuit low voltage	The maximum voltage from the sensor is not reached to the specified voltage.	<ul style="list-style-type: none">• Harness or connectors (Heated oxygen sensor 2 circuit open or shorted.)• Heated oxygen sensor 2• Fuel pressure• Fuel injector• Intake air leaks

DTC Confirmation Procedure

INFOID:000000005532573

NOTE:

If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

TESTING CONDITION:

For the best results, perform DTC WORK SUPPORT at a temperature of 0 to 30°C (32 to 86°F).

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select "HO2S2 (B1) P1147" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
9. Following the instruction of CONSULT-III.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

10. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
If "NG" is displayed, refer to [EC-726. "Diagnosis Procedure"](#).
If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
 - a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
 - b. Return to step 1.

Overall Function Check

INFOID:000000005532574

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

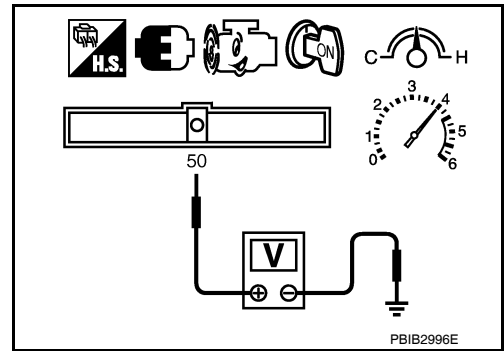
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle 1 minute.
5. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.

DTC P0137 HO2S2

[MR18DE]

< SERVICE INFORMATION >

6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be above 0.68 V (M/T and A/T) or 0.72V (CVT) at least once during this procedure.
If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with OD OFF (A/T), D position (CVT) or 3rd gear position (M/T).
The voltage should be above 0.68 V (M/T and A/T) or 0.72V (CVT) at least once during this procedure.
8. If NG, go to [EC-726, "Diagnosis Procedure"](#).

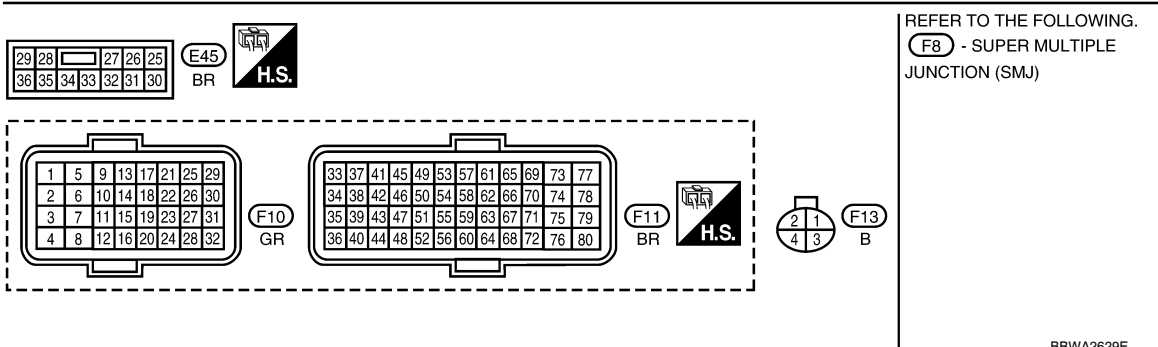
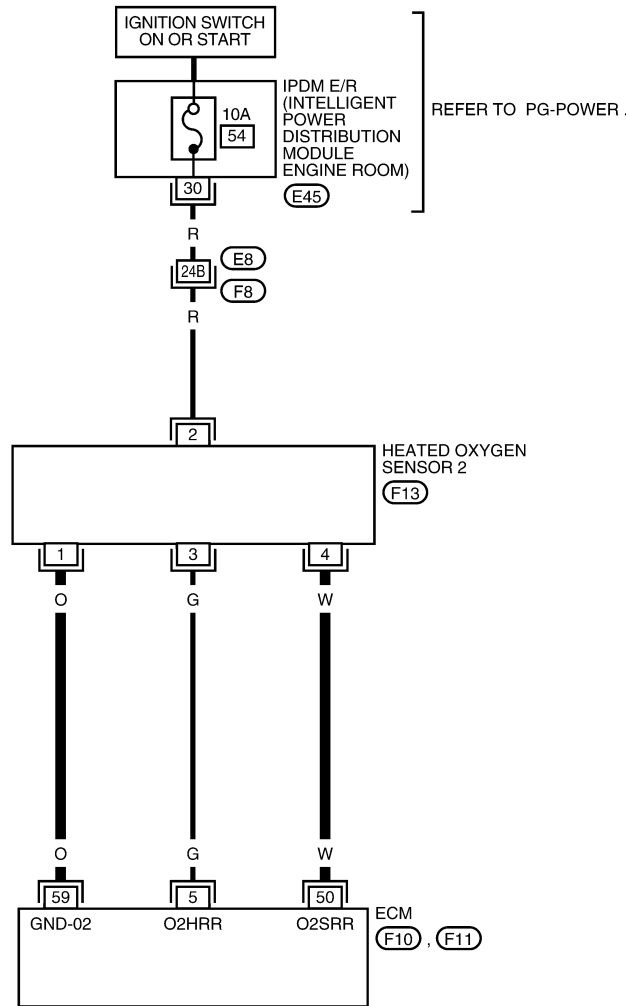


Wiring Diagram

INFOID:000000005532575

EC-HO2S2-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

CAUTION:

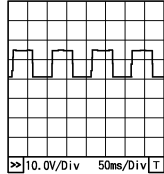
A
 EC
 C
 D
 E
 F
 G
 H
 I
 J
 K
 L
 M
 N
 O
 P

DTC P0137 HO2S2

< SERVICE INFORMATION >

[MR18DE]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	G	Heated oxygen sensor 2 heater	[Engine is running] <ul style="list-style-type: none"> Engine speed: Below 3,600 rpm after the following conditions are met. <ul style="list-style-type: none"> - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. 	Approximately 10 V★  PBIAB148J
			[Ignition switch: ON] <ul style="list-style-type: none"> Engine stopped [Engine is running] <ul style="list-style-type: none"> Engine speed: Above 3,600 rpm. 	BATTERY VOLTAGE (11 - 14 V)
50	W	Heated oxygen sensor 2	[Engine is running] <ul style="list-style-type: none"> Revvng engine from idle to 3,000 rpm quickly after the following conditions are met. <ul style="list-style-type: none"> - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. 	0 - Approximately 1.0 V
59	O	Sensor ground (Heated oxygen sensor 2)	[Engine is running] <ul style="list-style-type: none"> Warm-up condition Idle speed 	Approximately 0 V

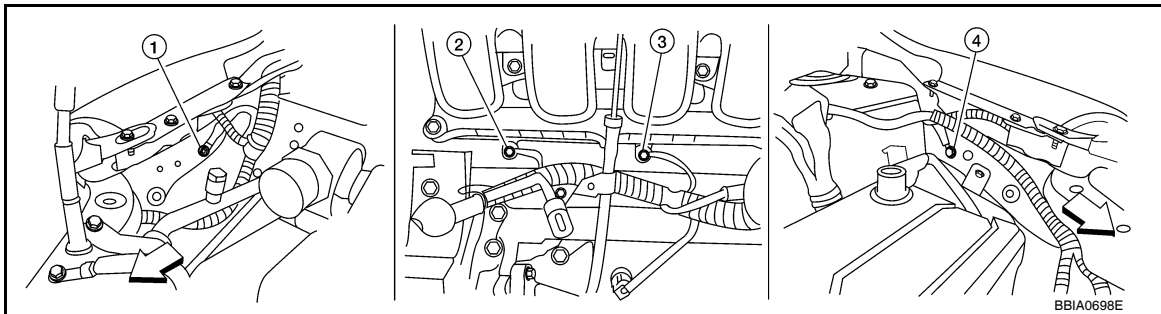
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005532576

1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten ground screw on the body.
Refer to [EC-638, "Ground Inspection"](#).



↙: Vehicle front

- Body ground E24
- Body ground E15

2. Engine ground F9

3. Engine ground F16

OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

 With CONSULT-III

< SERVICE INFORMATION >

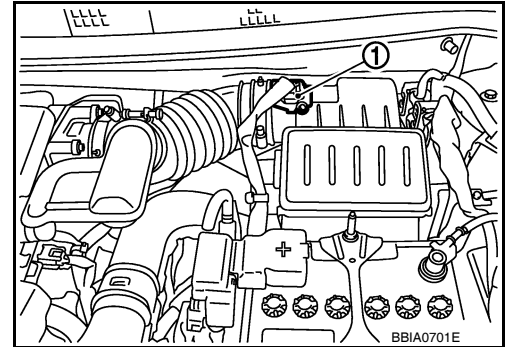
1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.

**Is the 1st trip DTC P0171 detected?
Is it difficult to start engine?**

⊗ Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor (1) harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to [EC-542, "Emission-related Diagnostic Information"](#).
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.

**Is the 1st trip DTC P0171 detected?
Is it difficult to start engine?**



Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171. Refer to [EC-758](#).
- No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector (2).
 - ◀: Vehicle front
 - Heated oxygen sensor 2 (1)
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 59 and HO2S2 terminal 1. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 4.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and HO2S2 terminal 4. Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 50 or HO2S2 terminal 4 and ground. Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

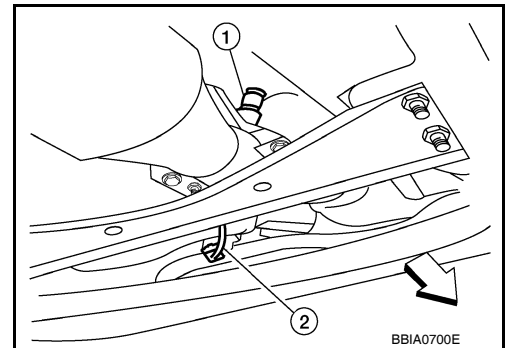
OK or NG

- OK >> GO TO 5.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to [EC-728, "Component Inspection"](#).

OK or NG



< SERVICE INFORMATION >

- OK >> GO TO 6.
- NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> INSPECTION END

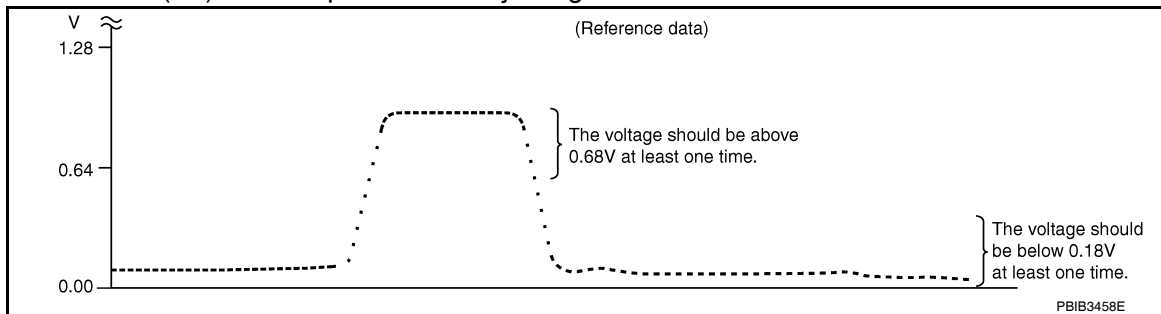
Component Inspection

INFOID:000000005532577

HEATED OXYGEN SENSOR 2 (M/T AND A/T MODELS)

Ⓟ With CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-III.
6. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)" should be above 0.68 V at least once when the "FUEL INJECTION" is +25%.
 "HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is -25%.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

ⓧ Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.

5. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.

6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.

(Depress and release accelerator pedal as soon as possible.)

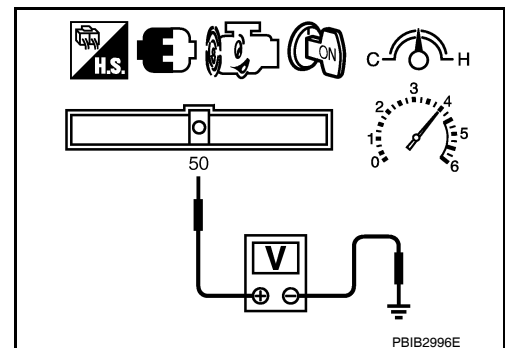
The voltage should be above 0.68 V and below 0.18 V at least once during this procedure.

If the voltage can be confirmed at step 6, step 7 is not necessary.

7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with OD OFF (A/T) or 3rd gear position (M/T).

The voltage should be above 0.68 V and below 0.18 V at least once during this procedure.

8. If NG, replace heated oxygen sensor 2.



< SERVICE INFORMATION >

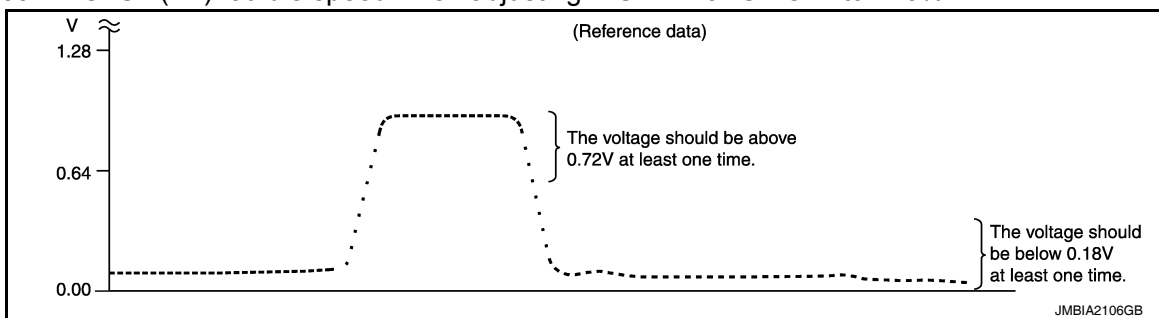
CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

HEATED OXYGEN SENSOR 2 (CVT MODELS)

④ With CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-III.
6. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



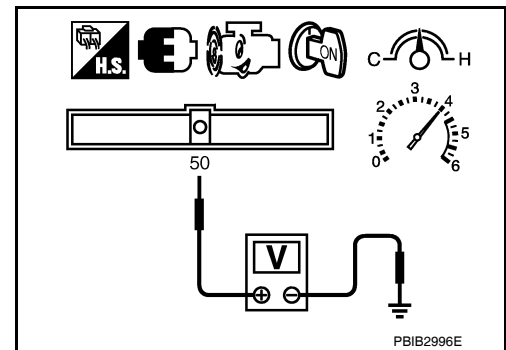
"HO2S2 (B1)" should be above 0.72 V at least once when the "FUEL INJECTION" is +25%.
 "HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is -25%.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

⊗ Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
 (Depress and release accelerator pedal as soon as possible.)
The voltage should be above 0.72 V and below 0.18 V at least once during this procedure.
If the voltage can be confirmed at step 6, step 7 is not necessary.
7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position.
The voltage should be above 0.72 V and below 0.18 V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

**CAUTION:**

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

< SERVICE INFORMATION >

Removal and Installation

INFOID:000000005532578

HEATED OXYGEN SENSOR 2

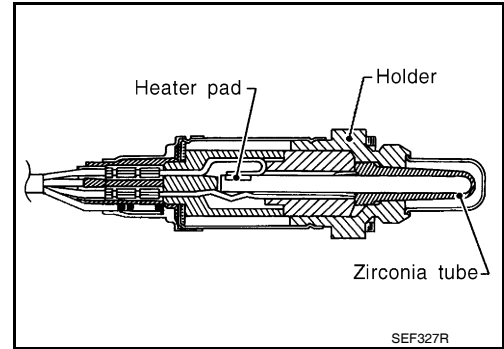
Refer to [EM-140. "Removal and Installation"](#).

DTC P0138 HO2S2

Component Description

INFOID:000000005532579

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas. Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air/fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2. This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions. Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532580

Specification data are reference values.

Monitor item	Condition	Specification
HO2S2 (B1)	<ul style="list-style-type: none"> • Revving engine from idle to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	0 - 0.3 V ↔ Approx. 0.6 - 1.0 V
HO2S2 MNTR (B1)		LEAN ↔ RICH

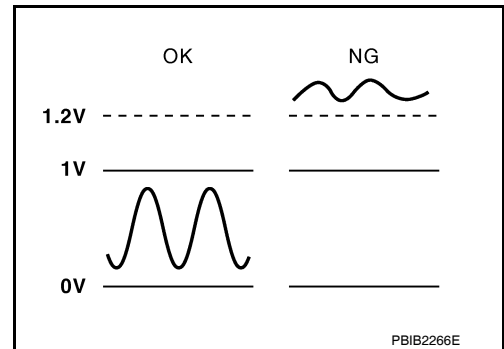
On Board Diagnosis Logic

INFOID:000000005532581

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time.

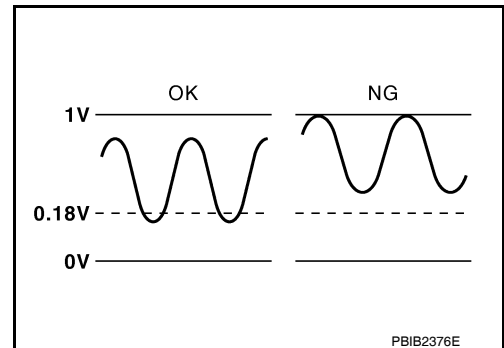
MALFUNCTION A

To judge the malfunctions of rear heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



MALFUNCTION B

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.



DTC P0138 HO2S2

< SERVICE INFORMATION >

[MR18DE]

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0138 0138	Heated oxygen sensor 2 circuit high voltage	A)	An excessively high voltage from the sensor is sent to ECM.	<ul style="list-style-type: none">• Harness or connectors (Heated oxygen sensor 2 circuit is open or shorted.)• Heated oxygen sensor 2
		B)	The minimum voltage from the sensor is not reached to the specified voltage.	<ul style="list-style-type: none">• Harness or connectors (Heated oxygen sensor circuit is open or shorted.)• Heated oxygen sensor 2• Fuel pressure• Fuel injector

DTC Confirmation Procedure

INFOID:000000005532582

Perform PROCEDURE FOR MALFUNCTION A first.

If DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 2 minutes.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-735, "Diagnosis Procedure"](#).

PROCEDURE FOR MALFUNCTION B

 With CONSULT-III

TESTING CONDITION:

For the best results, perform DTC WORK SUPPORT at a temperature of 0 to 30°C (32 to 86°F).

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
9. Following the instruction of CONSULT-III.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

10. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
If "NG" is displayed, refer to [EC-735, "Diagnosis Procedure"](#).
If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
 - a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
 - b. Return to step 1.

Overall Function Check

INFOID:000000005532583

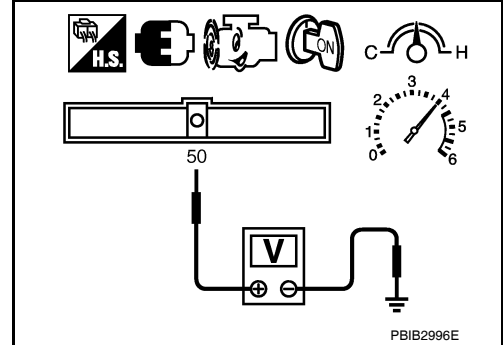
PROCEDURE FOR MALFUNCTION B

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

< SERVICE INFORMATION >

 With GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle 1 minute.
5. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be below 0.18 V at least once during this procedure.
If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with OD OFF (A/T), D position (CVT) or 3rd gear position (M/T).
The voltage should be below 0.18 V at least once during this procedure.
8. If NG, go to [EC-735. "Diagnosis Procedure"](#).



DTC P0138 HO2S2

[MR18DE]

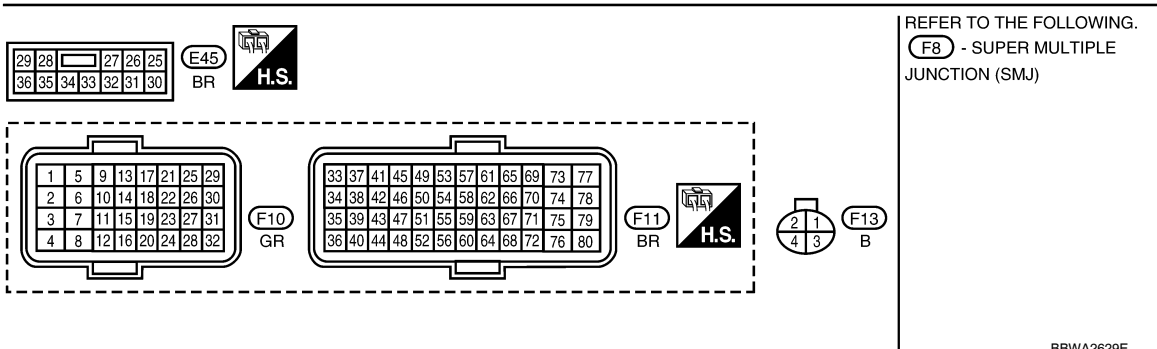
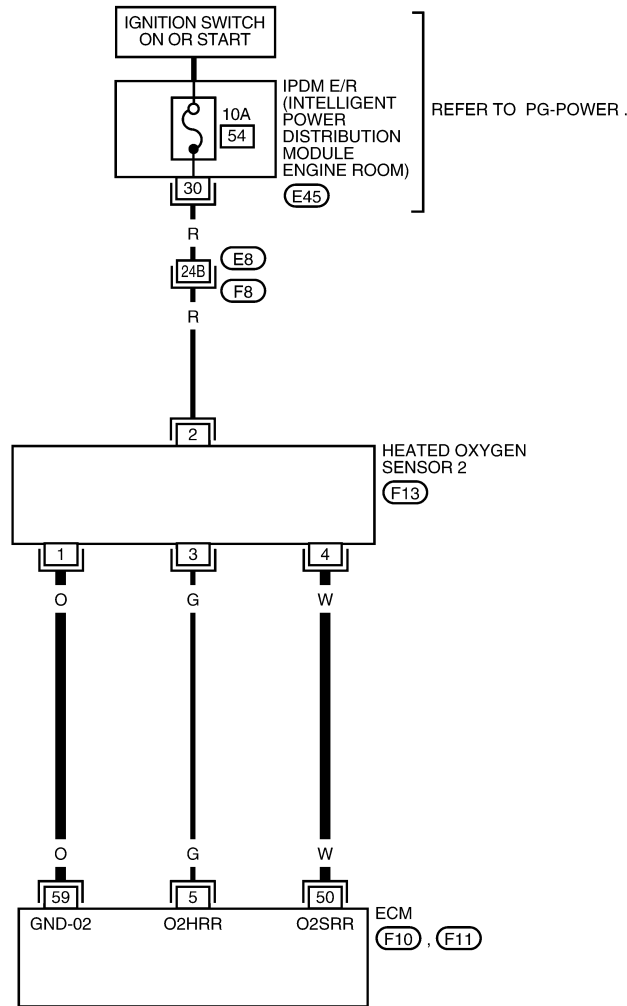
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000005532584

EC-HO2S2-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

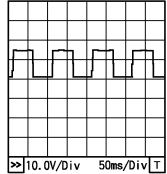
CAUTION:

DTC P0138 HO2S2

< SERVICE INFORMATION >

[MR18DE]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	G	Heated oxygen sensor 2 heater	[Engine is running] <ul style="list-style-type: none"> Engine speed: Below 3,600 rpm after the following conditions are met. <ul style="list-style-type: none"> - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. 	Approximately 10 V★ 
			[Ignition switch: ON] <ul style="list-style-type: none"> Engine stopped [Engine is running] <ul style="list-style-type: none"> Engine speed: Above 3,600 rpm. 	BATTERY VOLTAGE (11 - 14 V)
50	W	Heated oxygen sensor 2	[Engine is running] <ul style="list-style-type: none"> Revvng engine from idle to 3,000 rpm quickly after the following conditions are met. <ul style="list-style-type: none"> - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. 	0 - Approximately 1.0 V
59	O	Sensor ground (Heated oxygen sensor 2)	[Engine is running] <ul style="list-style-type: none"> Warm-up condition Idle speed 	Approximately 0 V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

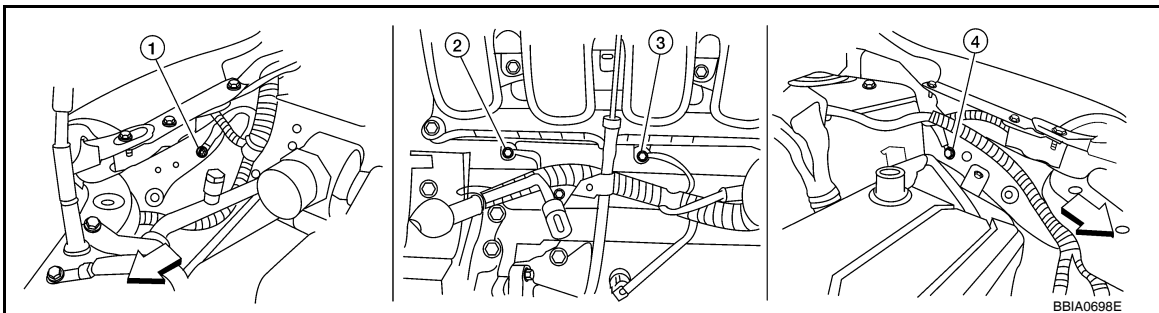
Diagnosis Procedure

INFOID:0000000005532585

PROCEDURE FOR MALFUNCTION A

1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten engine screw on the body.
Refer to [EC-638, "Ground Inspection"](#).



↔ Vehicle front

- body ground E24
- Body ground E15

2. Engine ground F9

3. Engine ground F16

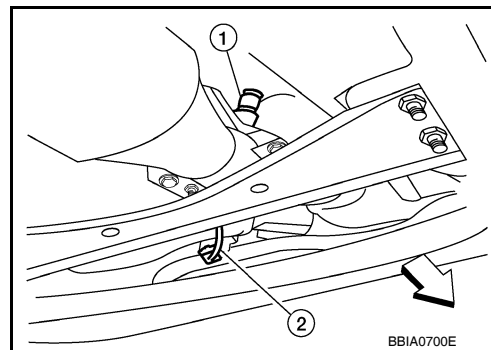
OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace ground connections.

< SERVICE INFORMATION >

2. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector (2).
 - ⇐: Vehicle front
 - Heated oxygen sensor 2 (1)
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 59 and HO2S2 terminal 1. Refer to Wiring Diagram.



Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and HO2S2 terminal 4. Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 50 or HO2S2 terminal 4 and ground. Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 5.

NG >> Repair or replace harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to [EC-738, "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace heated oxygen sensor 2.

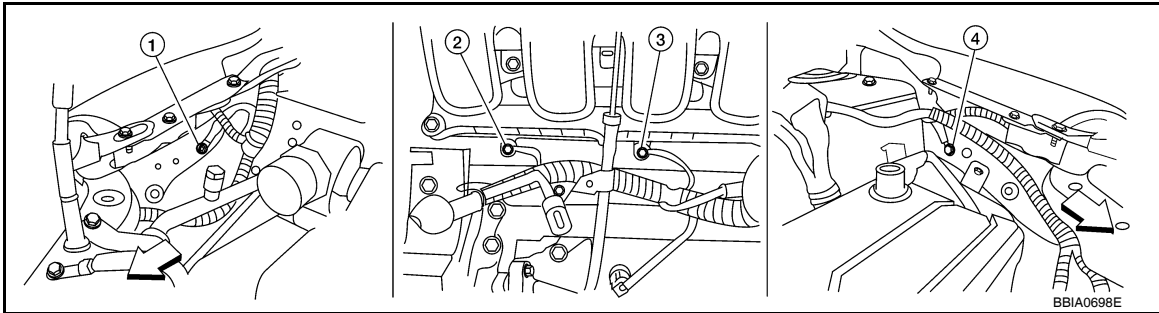
6. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> INSPECTION END

PROCEDURE FOR MALFUNCTION B**1. CHECK GROUND CONNECTIONS**

1. Turn ignition switch OFF.
2. Loosen and retighten engine screw on the body. Refer to [EC-638, "Ground Inspection"](#).



← Vehicle front

- 1. Body ground E24
- 4. Body ground E15

- 2. Engine ground F9

- 3. Engine ground F16

OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

With CONSULT-III

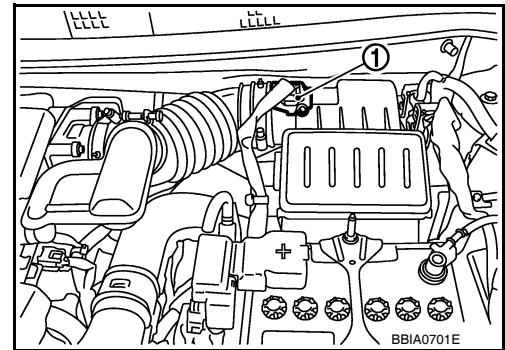
- 1. Start engine and warm it up to normal operating temperature.
- 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
- 3. Clear the self-learning control coefficient by touching "CLEAR".
- 4. Run engine for at least 10 minutes at idle speed.

**Is the 1st trip DTC P0172 detected?
Is it difficult to start engine?**

Without CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF.
- 3. Disconnect mass air flow sensor (1) harness connector, and restart and run engine for at least 5 seconds at idle speed.
- 4. Stop engine and reconnect mass air flow sensor harness connector.
- 5. Make sure that DTC P0102 is displayed.
- 6. Erase the DTC memory. Refer to [EC-542. "Emission-related Diagnostic Information"](#).
- 7. Make sure that DTC P0000 is displayed.
- 8. Run engine for at least 10 minutes at idle speed.

**Is the 1st trip DTC P0172 detected?
Is it difficult to start engine?**



Yes or No

Yes >> Perform trouble diagnosis for DTC P0172. Refer to [EC-764](#).

No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.

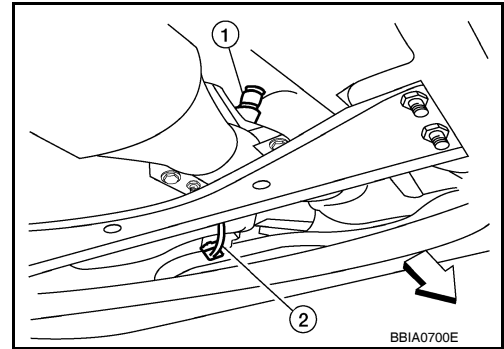
A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

DTC P0138 HO2S2

[MR18DE]

< SERVICE INFORMATION >

2. Disconnect heated oxygen sensor 2 harness connector (2).
 - ⇐: Vehicle front
 - Heated oxygen sensor 2 (1)
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 59 and HO2S2 terminal 1. Refer to Wiring Diagram.



Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and HO2S2 terminal 4. Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 50 or HO2S2 terminal 4 and ground. Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to [EC-738, "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> INSPECTION END

Component Inspection

INFOID:000000005532586

HEATED OXYGEN SENSOR 2 (M/T AND A/T MODELS)

④ With CONSULT-III

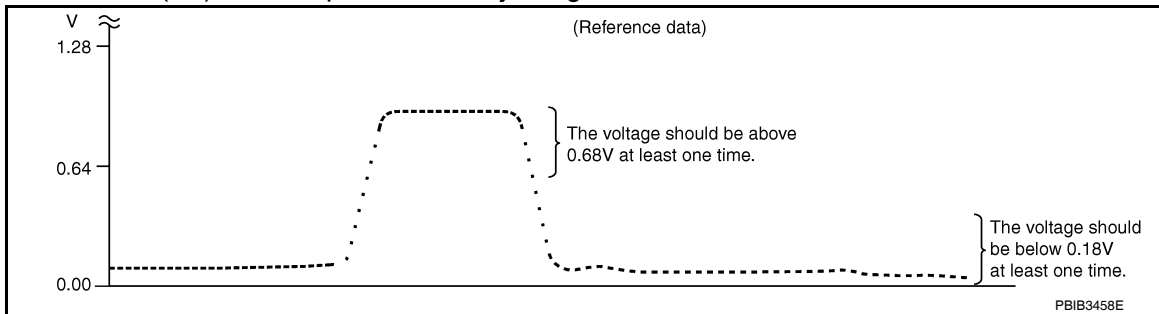
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-III.

DTC P0138 HO2S2

< SERVICE INFORMATION >

[MR18DE]

6. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)" should be above 0.68 V at least once when the "FUEL INJECTION" is +25%.
 "HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is -25%.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

⊗ Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.

(Depress and release accelerator pedal as soon as possible.)

The voltage should be above 0.68 V and below 0.18 V at least once during this procedure.

If the voltage can be confirmed at step 6, step 7 is not necessary.

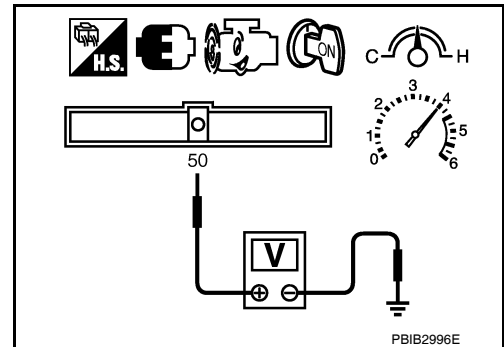
7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with OD OFF (A/T) or 3rd gear position (M/T).

The voltage should be above 0.68 V and below 0.18 V at least once during this procedure.

8. If NG, replace heated oxygen sensor 2.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.



HEATED OXYGEN SENSOR 2 (CVT MODELS)

Ⓜ With CONSULT-III

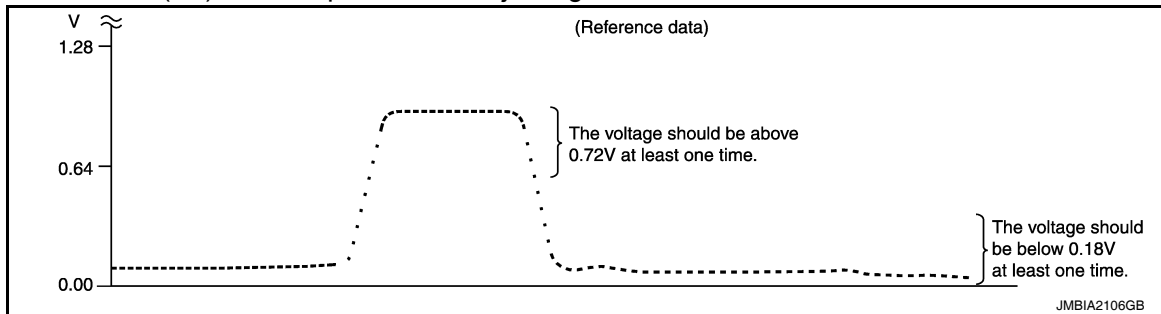
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-III.

DTC P0138 HO2S2

[MR18DE]

< SERVICE INFORMATION >

6. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)" should be above 0.72 V at least once when the "FUEL INJECTION" is +25%.
"HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is -25%.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

⊗ Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.

(Depress and release accelerator pedal as soon as possible.)

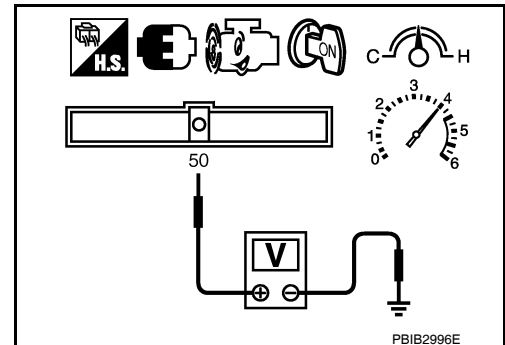
The voltage should be above 0.72 V and below 0.18 V at least once during this procedure.

If the voltage can be confirmed at step 6, step 7 is not necessary.

7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position.
The voltage should be above 0.72 V and below 0.18 V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.



Removal and Installation

INFOID:000000005532587

HEATED OXYGEN SENSOR 2

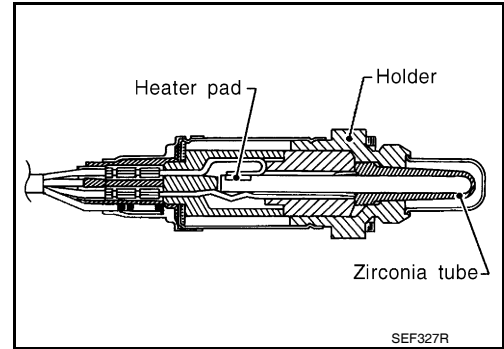
Refer to [EM-140. "Removal and Installation"](#).

DTC P0139 HO2S2

Component Description

INFOID:000000005532588

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas. Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air/fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2. This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions. Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532589

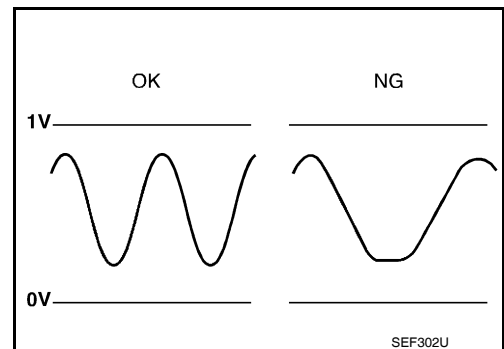
Specification data are reference values.

Monitor item	Condition	Specification
HO2S2 (B1)	<ul style="list-style-type: none"> • Revving engine from idle to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	0 - 0.3 V ↔ Approx. 0.6 - 1.0 V
HO2S2 MNTR (B1)		LEAN ↔ RICH
HO2 S2 DIAG1 (B1)	DTC P0139 self-diagnosis (delayed response) is incomplete.	INCMP
	DTC P0139 self-diagnosis (delayed response) is complete.	CMPLT
HO2 S2 DIAG2 (B1)	DTC P0139 self-diagnosis (slow response) is incomplete.	INCMP
	DTC P0139 self-diagnosis (slow response) is complete.	CMPLT

On Board Diagnosis Logic

INFOID:000000005532590

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst 1 causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during various driving conditions such as fuel cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139 0139	Heated oxygen sensor 2 (bank 1) circuit slow response	The switching time between rich and lean of a heated oxygen sensor 2 signal delays more than the specified time computed by ECM.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel system • EVAP system • Intake air system

DTC Confirmation Procedure

INFOID:000000005532591

1.INSPECTION START

Do you have CONSULT-III?

< SERVICE INFORMATION >

Do you have CONSULT-III?

- YES >> GO TO 2.
NO >> GO TO 7.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

For better results, perform “DTC WORK SUPPORT” at a temperature of 0 to 30°C (32 to 86°F).

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE**ⓅWith CONSULT-III**

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
7. Let engine idle for 1 minute.
8. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
9. Drive the vehicle in a proper at 60 km/h (38MPH) and maintain the speed.

CAUTION:

Always drive vehicle at a safe speed.

10. Release the accelerator pedal fully at least 5 seconds.

CAUTION:

- **Enable engine brake.**
- **Always drive carefully.**
- **Never apply brake when releasing the accelerator pedal.**

11. Repeat step 9 and 10 at least 8 times.
12. Check the following item of “DATA MONITOR”.

DTC	Data monitor item	Status
P0139	HO2 S2 DIAG1 (B1)	CMPLT
	HO2 S2 DIAG2 (B1)	

Is “CMPLT” displayed on CONSULT-III screen?

- YES >> GO TO 6.
NO-1: “CMPLT” is not displayed on DIAG 1>>Perform DTC confirmation procedure again.
NO-2: “CMPLT” is not displayed on DIAG 2>>GO TO 4.

4.PERFORM DTC WORK SUPPORT

1. Open engine hood.
2. Select “HO2S2 (B1) P0139” in “DTC WORK SUPPORT” mode with CONSULT-III.
3. Start engine and follow the instruction of CONSULT-III display.

NOTE:

It will take at most 10 minutes until “COMPLETED” is displayed.

Is “COMPLETED” displayed on CONSULT-III screen?

- YES >> GO TO 6.
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Perform DTC confirmation procedure again.

< SERVICE INFORMATION >

>> GO TO 3.

6. PERFORM SELF-DIAGNOSIS

With CONSULT-III

Perform ECM self-diagnosis.

Is DTC "P0139" detected?

- YES >> Proceed to [EC-745, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

7. PERFORM OVERALL FUNCTION CHECK

Perform component function check. Refer to [EC-743, "Overall Function Check"](#).

NOTE:

Use overall function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to [EC-745, "Diagnosis Procedure"](#).

Overall Function Check

INFOID:000000005532592

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.

(Depress and release accelerator pedal as soon as possible.)

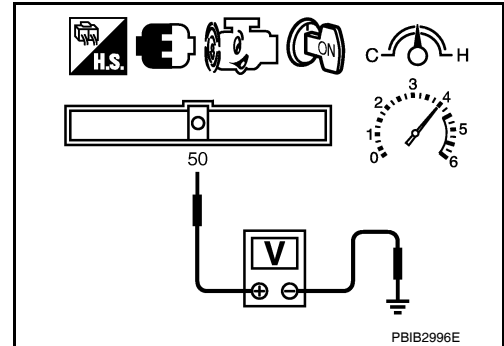
A change of voltage should be more than 0.8 V for 1 second during this procedure.

If the voltage can be confirmed in step 6, step 7 is not necessary.

7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with OD OFF (A/T), D position (CVT) or 3rd gear position (M/T).

A change of voltage should be more than 0.8 V for 1 second during this procedure.

8. If NG, go to [EC-745, "Diagnosis Procedure"](#).



DTC P0139 HO2S2

[MR18DE]

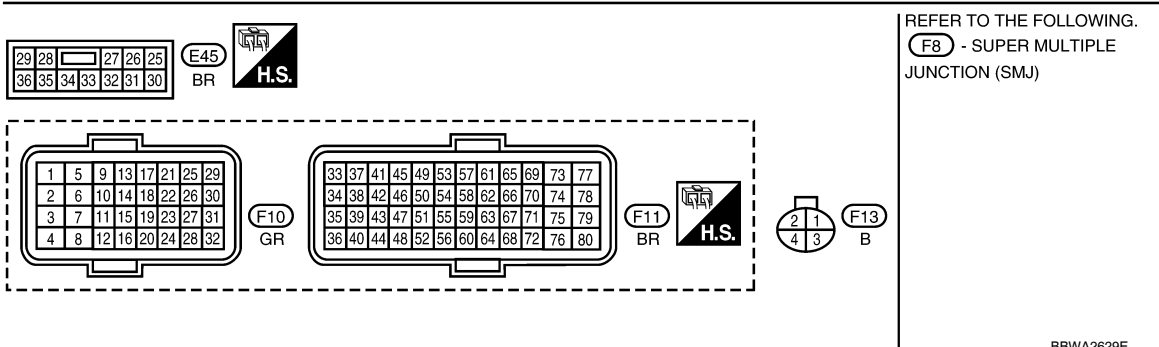
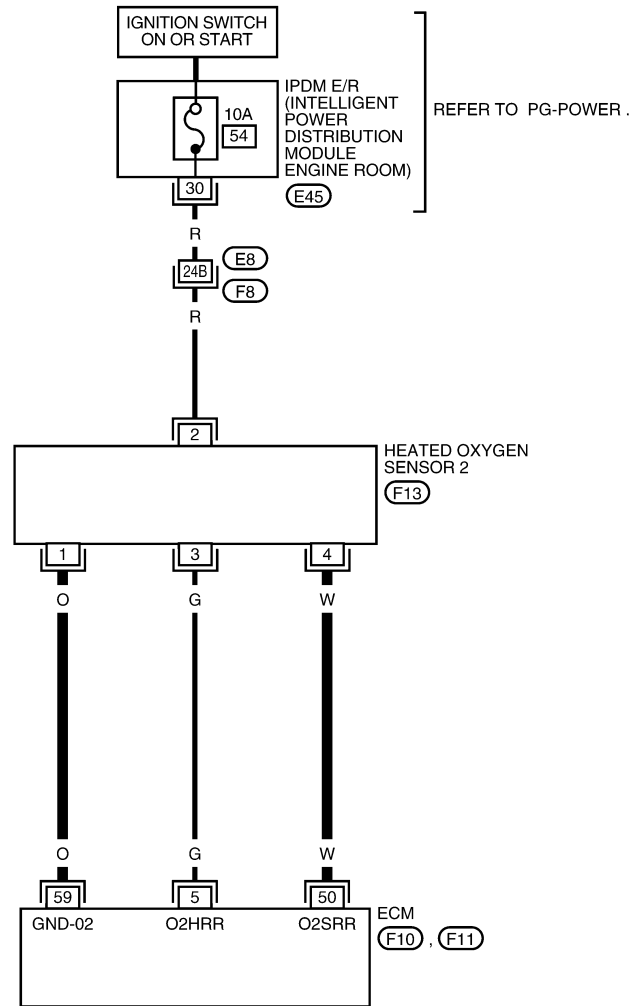
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000005532593

EC-HO2S2-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

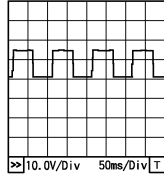
CAUTION:

DTC P0139 HO2S2

< SERVICE INFORMATION >

[MR18DE]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	G	Heated oxygen sensor 2 heater	[Engine is running] <ul style="list-style-type: none"> Engine speed: Below 3,600 rpm after the following conditions are met. <ul style="list-style-type: none"> - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. 	Approximately 10 V★ 
			[Ignition switch: ON] <ul style="list-style-type: none"> Engine stopped [Engine is running] <ul style="list-style-type: none"> Engine speed: Above 3,600 rpm. 	BATTERY VOLTAGE (11 - 14 V)
50	W	Heated oxygen sensor 2	[Engine is running] <ul style="list-style-type: none"> Revvng engine from idle to 3,000 rpm quickly after the following conditions are met. <ul style="list-style-type: none"> - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. 	0 - Approximately 1.0 V
59	O	Sensor ground (Heated oxygen sensor 2)	[Engine is running] <ul style="list-style-type: none"> Warm-up condition Idle speed 	Approximately 0 V

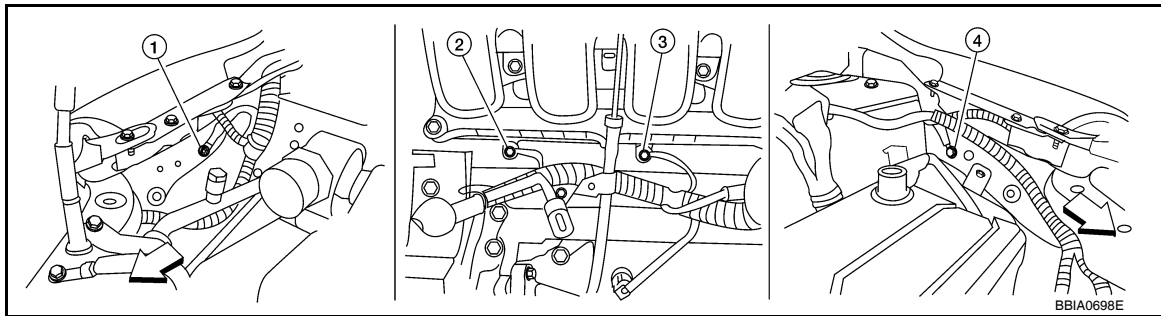
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005532594

1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten ground screw on the body.
Refer to [EC-638, "Ground Inspection"](#).



↔ Vehicle front

- Body ground E24
- Engine ground F9
- Engine ground F16
- Body ground E15

OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

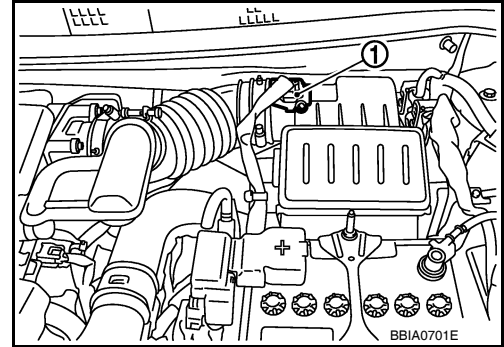
 With CONSULT-III

< SERVICE INFORMATION >

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.
**Is the 1st trip DTC P0171 or P0172 detected?
Is it difficult to start engine?**

⊗ Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor (1) harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure that DTC P0102 is displayed.
6. Erase the DTC memory. Refer to [EC-542, "Emission-related Diagnostic Information"](#).
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
**Is the 1st trip DTC P0171 or P0172 detected?
Is it difficult to start engine?**

Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to [EC-758](#) or [EC-764](#).
No >> GO TO 3.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

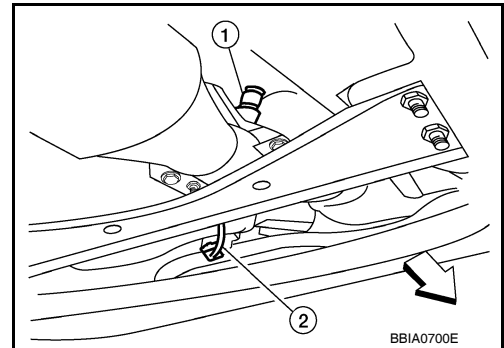
1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector (2).
- ⇐: Vehicle front
- Heated oxygen sensor 2 (1)
3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S2 terminal 1 and ECM terminal 59. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

**4.**CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 4 and ECM terminal 50.
Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 50 or HO2S2 terminal 4 and ground.
Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 2Refer to [EC-747, "Component Inspection"](#).OK or NG

< SERVICE INFORMATION >

- OK >> GO TO 6.
- NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> INSPECTION END

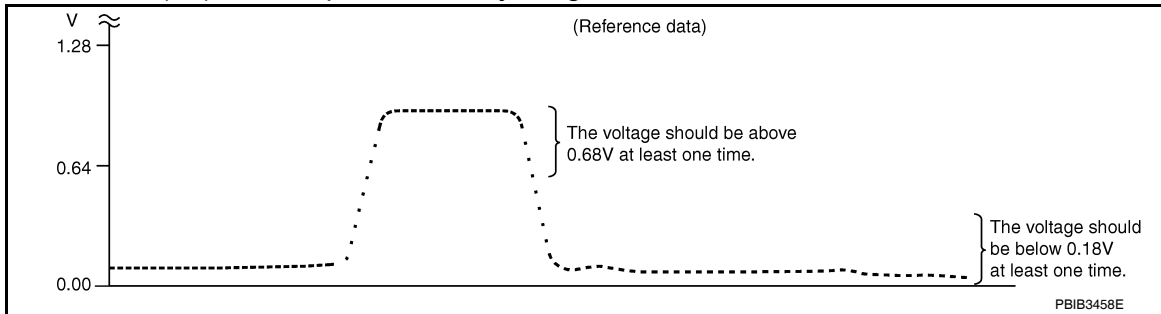
Component Inspection

INFOID:000000005532595

HEATED OXYGEN SENSOR 2 (M/T AND A/T MODELS)

ⓐ With CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-III.
6. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)" should be above 0.68 V at least once when the "FUEL INJECTION" is +25%.
 "HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is -25%.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

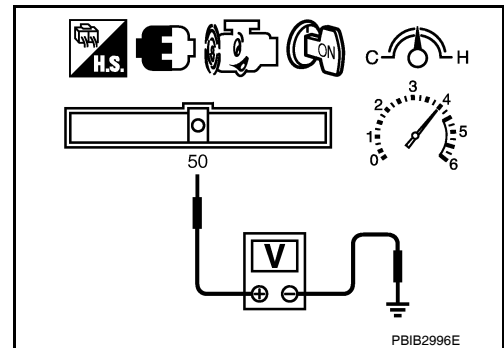
ⓑ Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
 (Depress and release accelerator pedal as soon as possible.)
The voltage should be above 0.68 V and below 0.18 V at least once during this procedure.
If the voltage can be confirmed at step 6, step 7 is not necessary.

7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with OD OFF (A/T) or 3rd gear position (M/T).

The voltage should be above 0.68 V and below 0.18 V at least once during this procedure.

8. If NG, replace heated oxygen sensor 2.



< SERVICE INFORMATION >

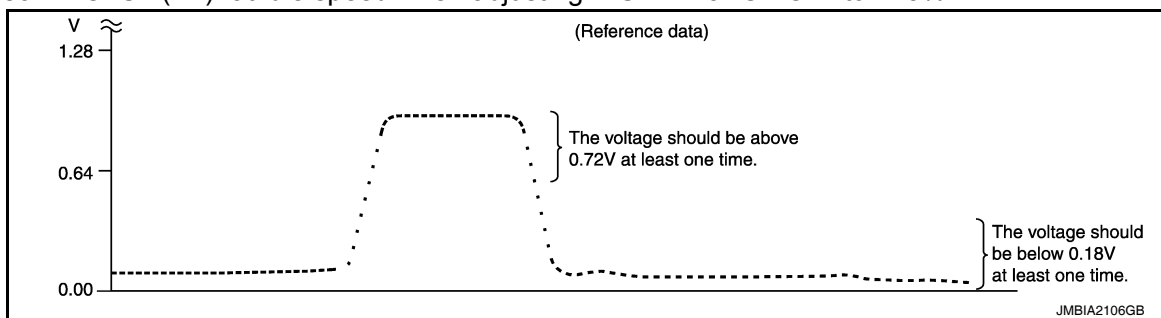
CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

HEATED OXYGEN SENSOR 2 (CVT MODELS)

④ With CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-III.
6. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



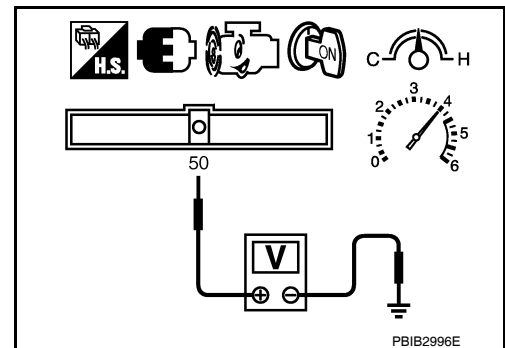
"HO2S2 (B1)" should be above 0.72 V at least once when the "FUEL INJECTION" is +25%.
 "HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is -25%.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

⊗ Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
 (Depress and release accelerator pedal as soon as possible.)
The voltage should be above 0.72 V and below 0.18 V at least once during this procedure.
If the voltage can be confirmed at step 6, step 7 is not necessary.
7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position.
The voltage should be above 0.72 V and below 0.18 V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

**CAUTION:**

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

Removal and Installation

INFOID:000000005532596

HEATED OXYGEN SENSOR 2

Refer to [EM-140. "Removal and Installation"](#).

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

DTC P014C, P014D, P015A, P015B, A/F SENSOR 1

< SERVICE INFORMATION >

[MR18DE]

DTC P014C, P014D, P015A, P015B, A/F SENSOR 1

Component Description

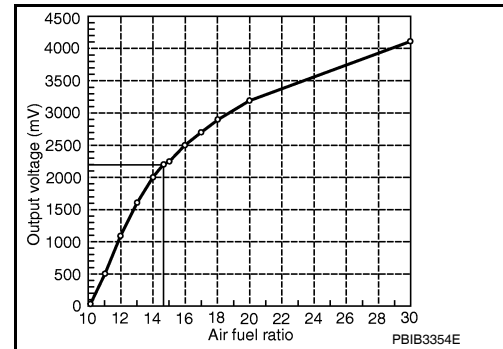
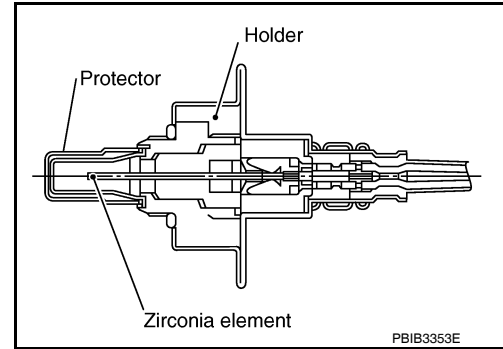
INFOID:000000005612766

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005612766

Specification data are reference values.

Monitor item	Condition		Specification
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
A/F SEN1 DIAG1 (B1)	DTC P015A and P015B self-diagnosis is incomplete.		INCMP
	DTC P015A and P015B self-diagnosis is complete.		CMPLT
A/F SEN1 DIAG2 (B1)	DTC P014C and P014D self-diagnosis is incomplete.		INCMP
	DTC P014C and P014D self-diagnosis is complete.		CMPLT
A/F SEN1 DIAG3 (B1)	The vehicle condition is not within the diagnosis range of DTC P014C, P014D, P015A or P015B.		ABSNT
	The vehicle condition is within the diagnosis range of DTC P014C, P014D, P015A or P015B.		PRSNT

On Board Diagnosis Logic

INFOID:000000005612761

To judge malfunctions, this diagnosis measures response time of the A/F signal computed by ECM from the A/F sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the A/F sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P014C	Air fuel ratio (A/F) sensor 1 (bank 1) circuit slow response	• The response time of a A/F sensor 1 signal delays more than the specified time computed by ECM.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • A/F sensor 1
P014D			
P015A	Air fuel ratio (A/F) sensor 1 (bank 1) circuit delayed response		
P015B			

DTC P014C, P014D, P015A, P015B, A/F SENSOR 1

< SERVICE INFORMATION >

[MR18DE]

INFOID:000000005612762

DTC Confirmation Procedure

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

Do you have CONSULT-III?

- YES >> GO TO 2.
NO >> GO TO 5.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

Ⓜ With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
6. Let engine idle for 1 minute.
7. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
8. Fully release accelerator pedal and then let engine idle for about 1 minute.
9. Check the items status of "DATA MONITOR" as follows.

NOTE:

If "PRCNT" changed to "ABSNP", refer to [EC-705. "Overall Function Check"](#).

Data monitor item	Status
A/F SEN1 DIAG3 (B1)	PRCNT

Is "PRCNT" displayed on CONSULT-III screen?

- YES >> GO TO 4.
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-2

Ⓜ With CONSULT-III

Perform DTC confirmation procedure-1 again.

Is "PRCNT" displayed on CONSULT-III screen?

- YES >> GO TO 4.
NO >> Refer to [EC-705. "Overall Function Check"](#).

4. PERFORM DTC CONFIRMATION PROCEDURE-2

1. Wait for about 20 seconds at idle.
2. Check the items status of "DATA MONITOR" as follows.

NOTE:

If "CMPLT" changed to "INCMPT", refer to [EC-705. "Overall Function Check"](#).

Data monitor item	Status
A/F SEN1 DIAG1 (B1)	CMPLT
A/F SEN1 DIAG2 (B1)	

Is "CMPLT" displayed on CONSULT-III screen?

- YES >> GO TO 5.
NO >> Refer to [EC-705. "Overall Function Check"](#).

5. PERFORM SELF-DIAGNOSIS

Ⓜ With CONSULT-III

DTC P014C, P014D, P015A, P015B, A/F SENSOR 1

[MR18DE]

< SERVICE INFORMATION >

Check the "SELF-DIAG RESULT".

Is any DTC detected?

- YES >> Proceed to [EC-754, "Diagnosis Procedure"](#).
NO >> INSPECTION END

6. CHECK AIR-FUEL RATIO SELF-LEARNING VALUE

 **With GST**

1. Start engine and warm it up to normal operating temperature.
2. Select Service \$01 with GST.
3. Calculate the total value of "Short term fuel trim" and "Long term fuel trim" indications.

Is the total percentage within $\pm 15\%$?

- YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Intake air leaks
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Fuel injector
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor

>> Repair or replace malfunctioning part.

8. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
7. Fully release accelerator pedal and then let engine idle for about 1 minute.
8. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-754, "Diagnosis Procedure"](#).
NO >> INSPECTION END

DTC P014C, P014D, P015A, P015B, A/F SENSOR 1

< SERVICE INFORMATION >

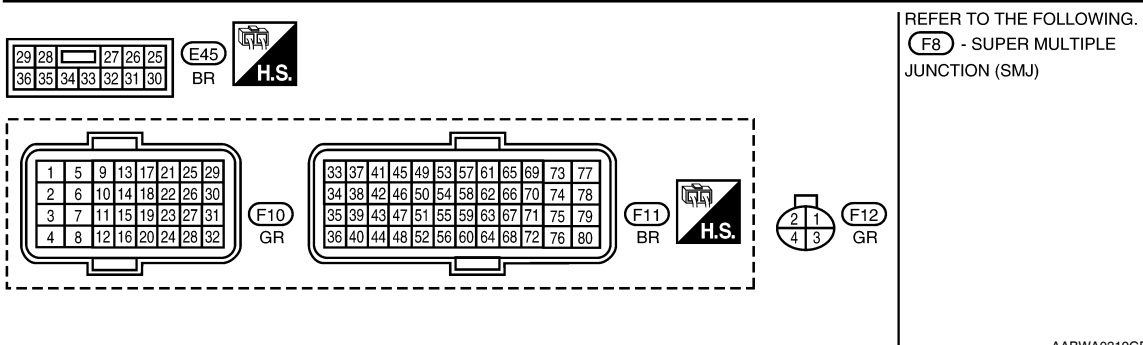
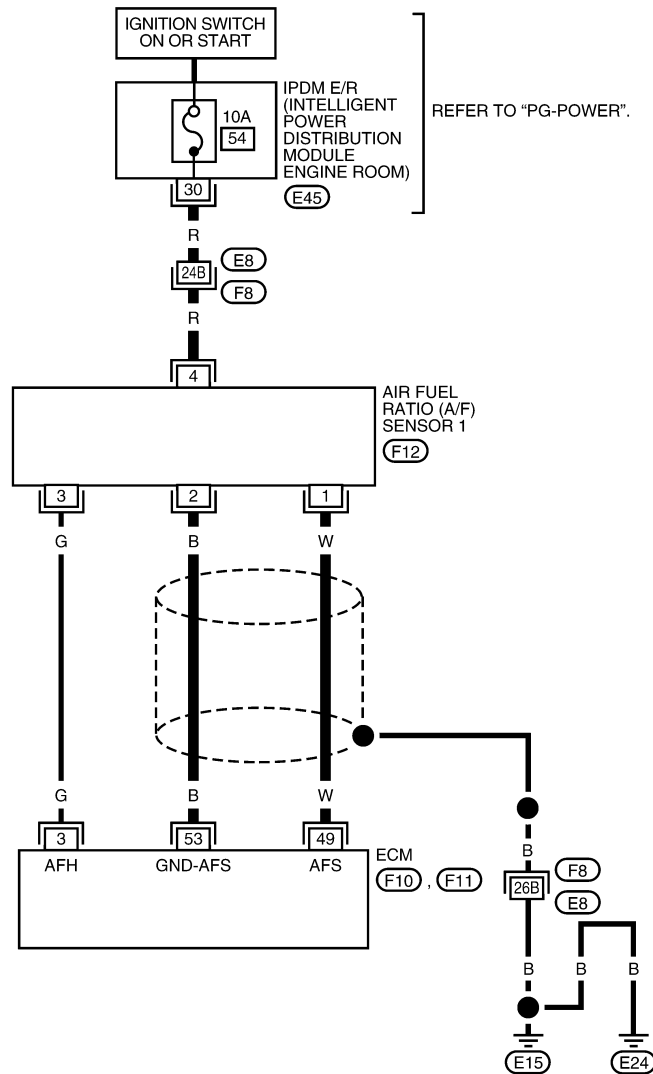
[MR18DE]

INFOID:000000005612767

Wiring Diagram

EC-A/F-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

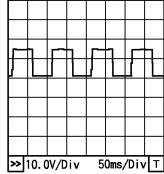
CAUTION:

DTC P014C, P014D, P015A, P015B, A/F SENSOR 1

< SERVICE INFORMATION >

[MR18DE]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8 V★ 
49	W	A/F sensor 1	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 1.8 V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	[Ignition switch: ON]	Approximately 2.2 V

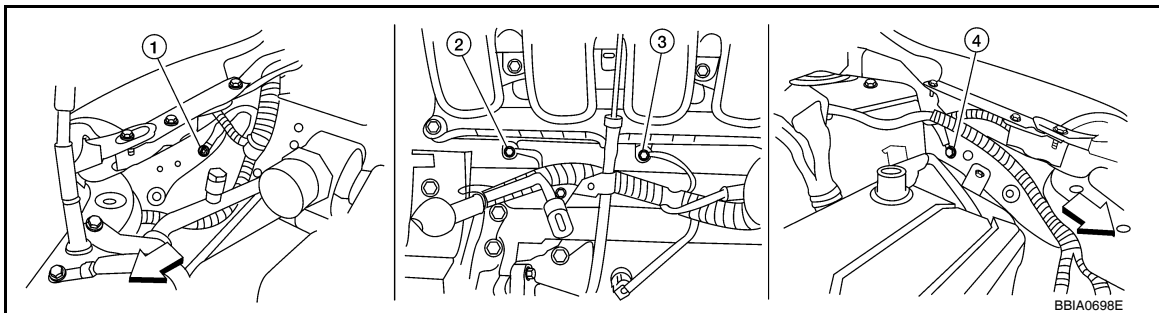
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005612764

1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten engine screw on the body.
Refer to [EC-638, "Ground Inspection"](#).



↙: Vehicle front

- Body ground E24
- Engine ground F9
- Engine ground F16
- Body ground E15

OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace ground connections.

2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1. Refer to [EM-140, "Removal and Installation"](#).

>> GO TO 3.

3. CHECK EXHAUST GAS LEAK

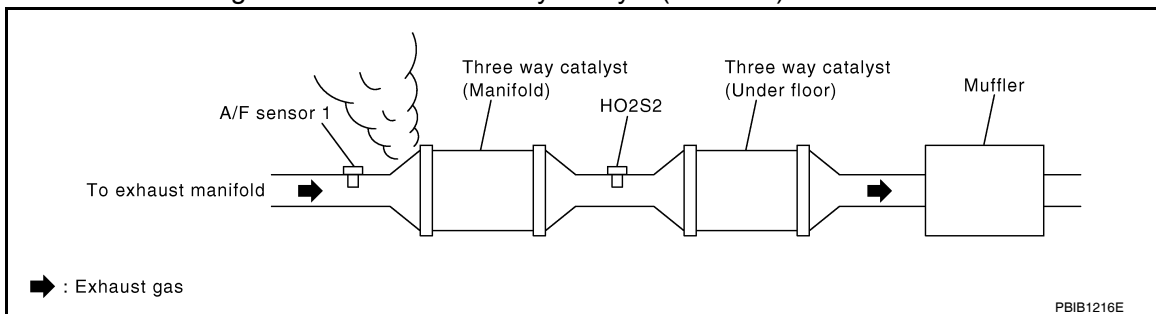
- Start engine and run it at idle.

DTC P014C, P014D, P015A, P015B, A/F SENSOR 1

[MR18DE]

< SERVICE INFORMATION >

- Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

- OK >> GO TO 4.
- NG >> Repair or replace.

4.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

- OK >> GO TO 5.
- NG >> Repair or replace.

5.CLEAR THE SELF-LEARNING DATA

With CONSULT-III

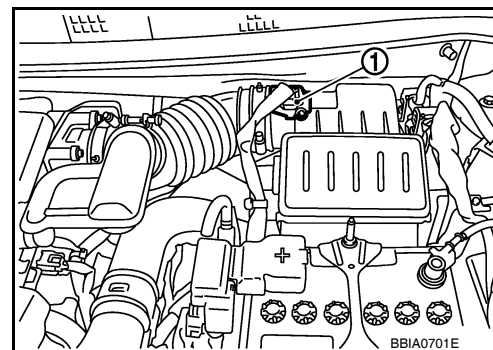
- Start engine and warm it up to normal operating temperature.
- Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
- Clear the self-learning control coefficient by touching "CLEAR" or "START".
- Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

Without CONSULT-III

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF.
- Disconnect mass air flow sensor (1) harness connector, and restart and run engine for at least 5 seconds at idle speed.
- Stop engine and reconnect mass air flow sensor harness connector.
- Make sure DTC P0102 is displayed.
- Erase the DTC memory. Refer to [EC-542, "Emission-related Diagnostic Information"](#).
- Make sure DTC P0000 is displayed.
- Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?



Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171, P0172. Refer to [EC-758](#) or [EC-764](#).
- No >> GO TO 6.

6.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

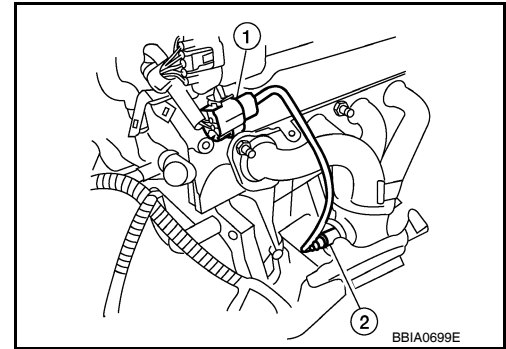
- Turn ignition switch OFF.

DTC P014C, P014D, P015A, P015B, A/F SENSOR 1

[MR18DE]

< SERVICE INFORMATION >

2. Disconnect A/F sensor 1 harness connector (1).
 - Air fuel ratio (A/F) sensor (2)
3. Turn ignition switch ON.

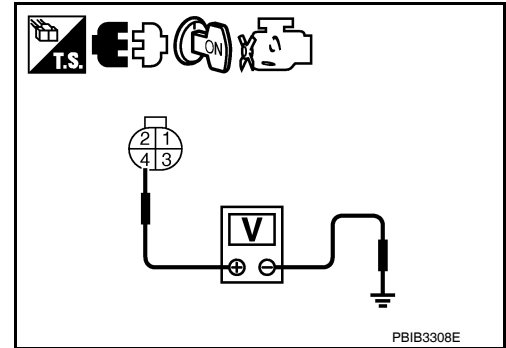


4. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 8.
- NG >> GO TO 7.



7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

4. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

- OK >> GO TO 9.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to [EC-652, "Component Inspection"](#).

OK or NG

- OK >> GO TO 10.
- NG >> GO TO 13.

DTC P014C, P014D, P015A, P015B, A/F SENSOR 1

< SERVICE INFORMATION >

[MR18DE]

10. CHECK MASS AIR FLOW SENSOR

Refer to [EC-670. "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> Replace mass air flow sensor.

11. CHECK PCV VALVE

Refer to [EC-538. "Component Inspection"](#).

OK or NG

OK >> GO TO 12.

NG >> Repair or replace PCV valve.

12. CHECK INTERMITTENT INCIDENT

Perform [EC-632. "Description"](#).

OK or NG

OK >> GO TO 13.

NG >> Repair or replace.

13. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

Removal and Installation

INFOID:000000005612768

AIR FUEL RATIO SENSOR HEATER

Refer to [EM-140. "Removal and Installation"](#).

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

[MR18DE]

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

On Board Diagnosis Logic

INFOID:000000005532597

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the air fuel ratio (A/F) sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171 0171	Fuel injection system too lean	<ul style="list-style-type: none">Fuel injection system does not operate properly.The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	<ul style="list-style-type: none">Intake air leaksAir fuel ratio (A/F) sensor 1Fuel injectorExhaust gas leaksIncorrect fuel pressureLack of fuelMass air flow sensorIncorrect PCV hose connection

DTC Confirmation Procedure

INFOID:000000005532598

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

④ WITH CONSULT-III

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
- Clear the self-learning control coefficient by touching "CLEAR".
- Start engine.
If it is difficult to start engine, the fuel injection system has a malfunction.
Perform the following procedure is advised.
 - Crank engine while depressing accelerator pedal.
NOTE:
When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.
 - If engine starts, go to [EC-761, "Diagnosis Procedure"](#).
If engine does not start, check exhaust and intake air leak visually.
- Keep engine at idle for at least 5 minutes.
- Check 1st trip DTC.
The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to [EC-761, "Diagnosis Procedure"](#).
NOTE:
If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.
 - Turn ignition switch OFF and wait at least 10 seconds.
 - Start engine.
 - Maintain the following conditions for at least 10 consecutive minutes.
Hold the accelerator pedal as steady as possible.

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

[MR18DE]

VHCL SPEED SE	50 – 120 km/h (31 – 75 MPH)
---------------	-----------------------------

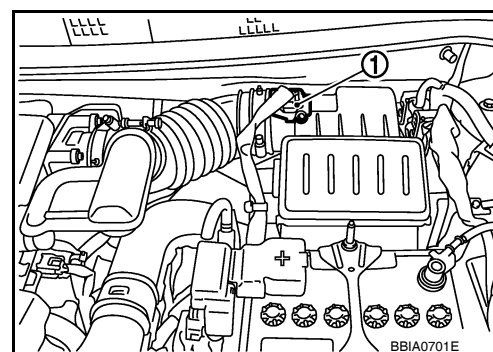
CAUTION:

Always drive vehicle at a safe speed.

- d. Check 1st trip DTC.
- e. If 1st trip DTC is detected, go to [EC-761, "Diagnosis Procedure"](#).

GS† WITH GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Disconnect mass air flow sensor (1) harness connector.
- 4. Restart engine and let idle for at least 5 seconds.
- 5. Stop engine and reconnect mass air flow sensor (1) harness connector.
- 6. Select Service \$03 with GST. Make sure DTC P0102 is detected.
- 7. Select Service \$04 with GST and erase the DTC P0102.



- 8. Start engine.
If it is difficult to start engine, the fuel injection system has a malfunction. Perform the following procedure is advised.

- a. Crank engine while depressing accelerator pedal.

NOTE:

When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

- b. If engine starts, go to [EC-761, "Diagnosis Procedure"](#).
If engine does not start, check exhaust and intake air leak visually.

- 9. Keep engine at idle for at least 5 minutes.

- 10. Check 1st trip DTC.

The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to [EC-761, "Diagnosis Procedure"](#).

NOTE:

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

- a. Turn ignition switch OFF and wait at least 10 seconds.
- b. Start engine.
- c. Maintain the following conditions for at least 10 consecutive minutes.
Hold the accelerator pedal as steady as possible.

VHCL SPEED SE	50 – 120 km/h (31 – 75 MPH)
---------------	-----------------------------

CAUTION:

Always drive vehicle at a safe speed.

- d. Check 1st trip DTC.
- e. If 1st trip DTC is detected, go to [EC-761, "Diagnosis Procedure"](#).

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

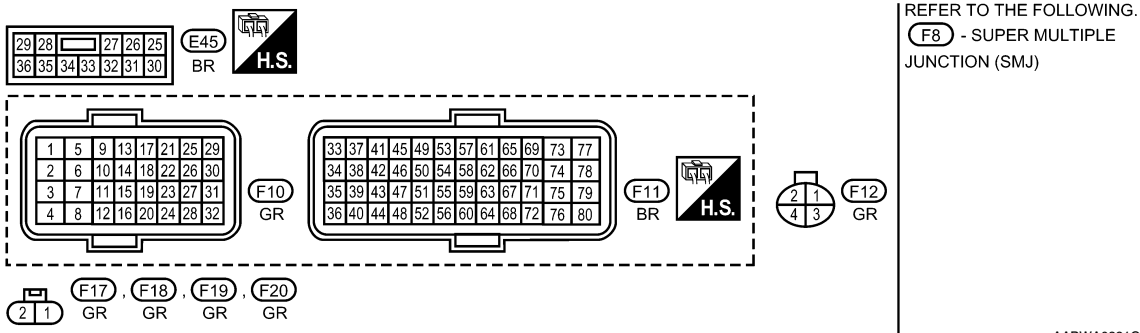
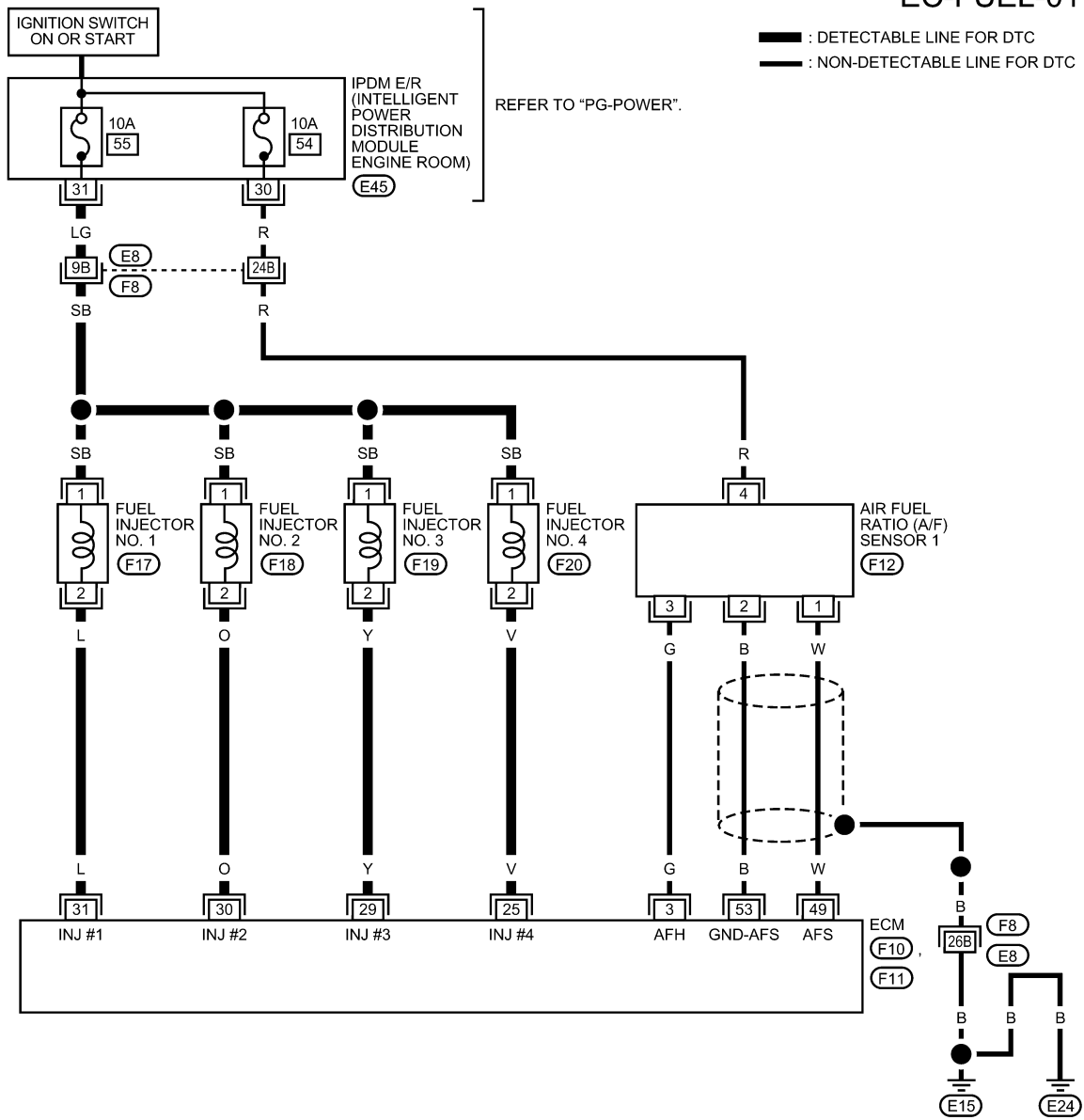
< SERVICE INFORMATION >

[MR18DE]

Wiring Diagram

INFOID:000000005532599

EC-FUEL-01



AABWA0321GB

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

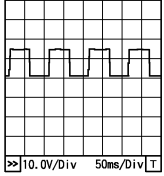
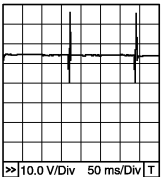
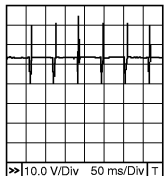
CAUTION:

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

[MR18DE]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	<p>[Engine is running]</p> <ul style="list-style-type: none"> • Warm-up condition • Idle speed (More than 140 seconds after starting engine) 	<p>Approximately 2.9 - 8.8 V★</p>  <p>PBIA8148J</p>
25 29 30 31	V Y O L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	<p>[Engine is running]</p> <ul style="list-style-type: none"> • Warm-up condition • Idle speed <p>NOTE: The pulse cycle changes depending on rpm at idle</p>	<p>BATTERY VOLTAGE (11 - 14 V)★</p>  <p>PBIB0529E</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> • Warm-up condition • Engine speed: 2,000 rpm 	<p>BATTERY VOLTAGE (11 - 14 V)★</p>  <p>PBIA4943J</p>
49	W	A/F sensor 1	<p>[Engine is running]</p> <ul style="list-style-type: none"> • Warm-up condition • Engine speed: 2,000 rpm 	<p>Approximately 1.8 V Output voltage varies with air fuel ratio.</p>
53	B	A/F sensor 1	[Ignition switch: ON]	Approximately 2.2 V

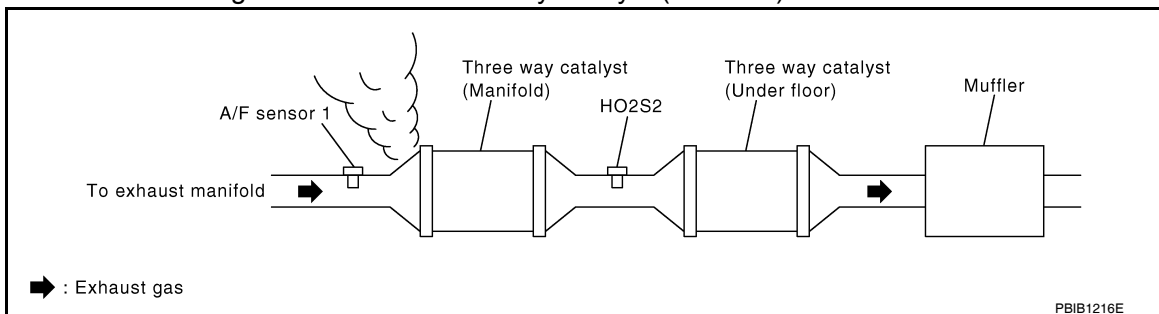
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005532600

1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

- OK >> GO TO 2.
- NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

[MR18DE]

< SERVICE INFORMATION >

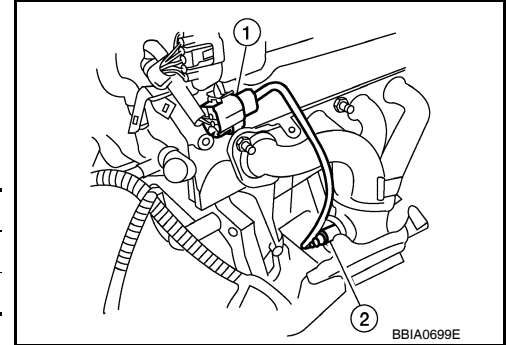
1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

OK or NG

- OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK AIR FUEL RATIO (A/F) SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect air fuel ratio (A/F) sensor 1 harness connector (1).
 - Air fuel ratio (A/F) sensor 1 (2)
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.



A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

5. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to [EC-582, "Fuel Pressure Check"](#).
2. Install fuel pressure gauge and check fuel pressure. Refer to [EC-582, "Fuel Pressure Check"](#).

At idling: Approximately 350 kPa (3.57 kg/cm², 51 psi)

OK or NG

- OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to [EC-1014](#).)
- Fuel pressure regulator (Refer to [EC-582, "Fuel Pressure Check"](#).)
- Fuel lines (Refer to [FL-5](#).)
- Fuel filter for clogging

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III.

At idling : 1.0 - 4.0 g·m/sec

At 2,500 rpm : 2.0 - 10.0 g·m/sec

With GST

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

[MR18DE]

< SERVICE INFORMATION >

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check mass air flow sensor signal in Service \$01 with GST.

At idling : 1.0 - 4.0 g·m/sec

At 2,500 rpm : 2.0 - 10.0 g·m/sec

OK or NG

OK >> GO TO 7.

NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to [EC-664](#).

7. CHECK FUNCTION OF FUEL INJECTORS

With CONSULT-III

1. Let engine idle.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-III

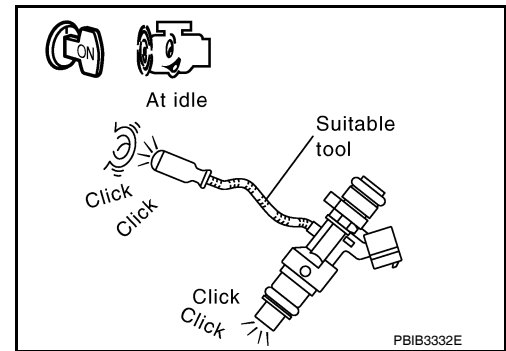
1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

OK or NG

OK >> GO TO 8.

NG >> Perform trouble diagnosis for [EC-1009](#).



8. CHECK FUEL INJECTOR

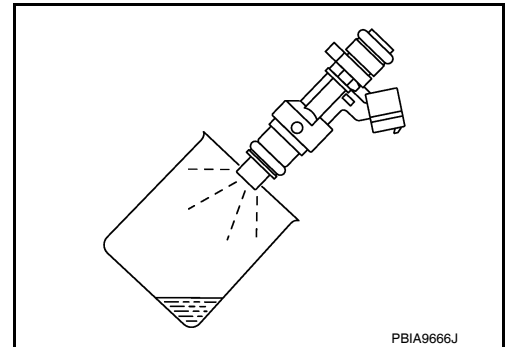
1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch OFF.
3. Reconnect all harness connectors disconnected.
4. Remove fuel tube assembly. Refer to [EM-152](#).
Keep fuel hose and all fuel injector connected to fuel tube.
The fuel injector harness connectors should remain connected.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each fuel injector.
7. Crank engine for about 3 seconds. Make sure that fuel sprays out from fuel injectors.

Fuel should be sprayed evenly for each fuel injector.

OK or NG

OK >> GO TO 9.

NG >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones.



9. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> INSPECTION END

DTC P0172 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

[MR18DE]

DTC P0172 FUEL INJECTION SYSTEM FUNCTION

On Board Diagnosis Logic

INFOID:000000005532601

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the air fuel ratio (A/F) sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172 0172	Fuel injection system too rich	<ul style="list-style-type: none"> Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.) 	<ul style="list-style-type: none"> Air fuel ratio (A/F) sensor 1 Fuel injector Exhaust gas leaks Incorrect fuel pressure Mass air flow sensor

DTC Confirmation Procedure

INFOID:000000005532602

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

④ WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
4. Clear the self-learning control coefficient by touching "CLEAR".
5. Start engine.
If it is difficult to start engine, the fuel injection system has a malfunction. Perform the following procedure is advised.
 - a. Crank engine while depressing accelerator pedal.
NOTE:
When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.
 - b. If engine starts, go to [EC-767. "Diagnosis Procedure"](#).
If engine does not start, remove ignition plugs and check for fouling, etc.
6. Keep engine at idle for at least 5 minutes.
7. Check 1st trip DTC.
The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to [EC-767. "Diagnosis Procedure"](#).
NOTE:
If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.
 - a. Turn ignition switch OFF and wait at least 10 seconds.
 - b. Start engine.
 - c. Maintain the following conditions for at least 10 consecutive minutes.
Hold the accelerator pedal as steady as possible.

VHCL SPEED SE	50 – 120 km/h (31 – 75 MPH)
---------------	-----------------------------

DTC P0172 FUEL INJECTION SYSTEM FUNCTION

[MR18DE]

< SERVICE INFORMATION >

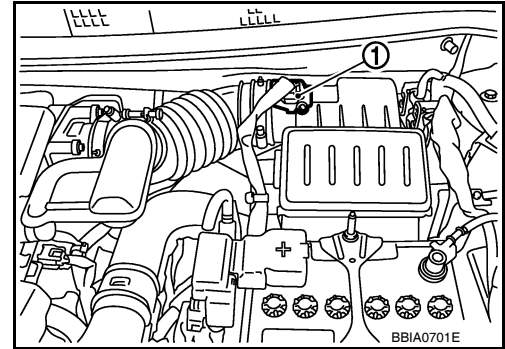
CAUTION:

Always drive vehicle at a safe speed.

- d. Check 1st trip DTC.
- e. If 1st trip DTC is detected, go to [EC-767, "Diagnosis Procedure"](#).

WITH GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Disconnect mass air flow sensor (1) harness connector.
- 4. Restart engine and let idle for at least 5 seconds.
- 5. Stop engine and reconnect mass air flow sensor harness connector.
- 6. Select Service \$03 with GST. Make sure DTC P0102 is detected.
- 7. Select Service \$04 with GST and erase the DTC P0102.



- 8. Start engine.
If it is difficult to start engine, the fuel injection system has a malfunction.

Perform the following procedure is advised.

- a. Crank engine while depressing accelerator pedal.

NOTE:

When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

- b. If engine starts, go to [EC-767, "Diagnosis Procedure"](#).
If engine does not start, remove ignition plugs and check for fouling, etc.
- 9. Keep engine at idle for at least 5 minutes.
- 10. Check 1st trip DTC.

The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to [EC-767, "Diagnosis Procedure"](#).

NOTE:

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

- a. Turn ignition switch OFF and wait at least 10 seconds.
- b. Start engine.
- c. Maintain the following conditions for at least 10 consecutive minutes.
Hold the accelerator pedal as steady as possible.

VHCL SPEED SE

50 – 120 km/h (31 – 75 MPH)

CAUTION:

Always drive vehicle at a safe speed.

- d. Check 1st trip DTC.
- e. If 1st trip DTC is detected, go to [EC-767, "Diagnosis Procedure"](#).

DTC P0172 FUEL INJECTION SYSTEM FUNCTION

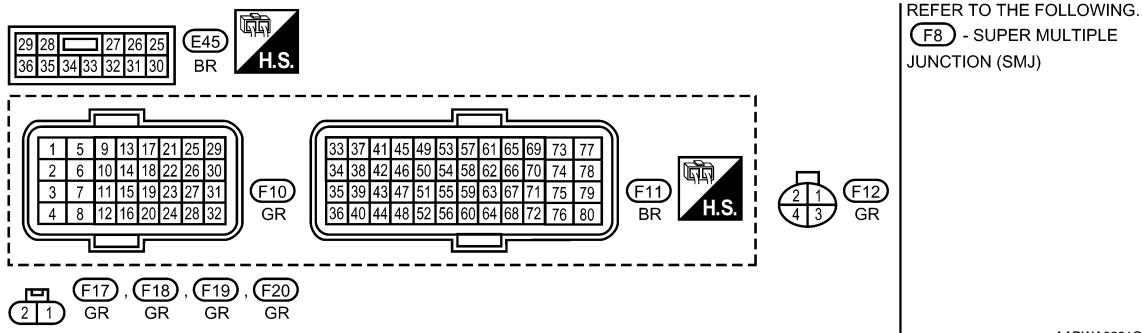
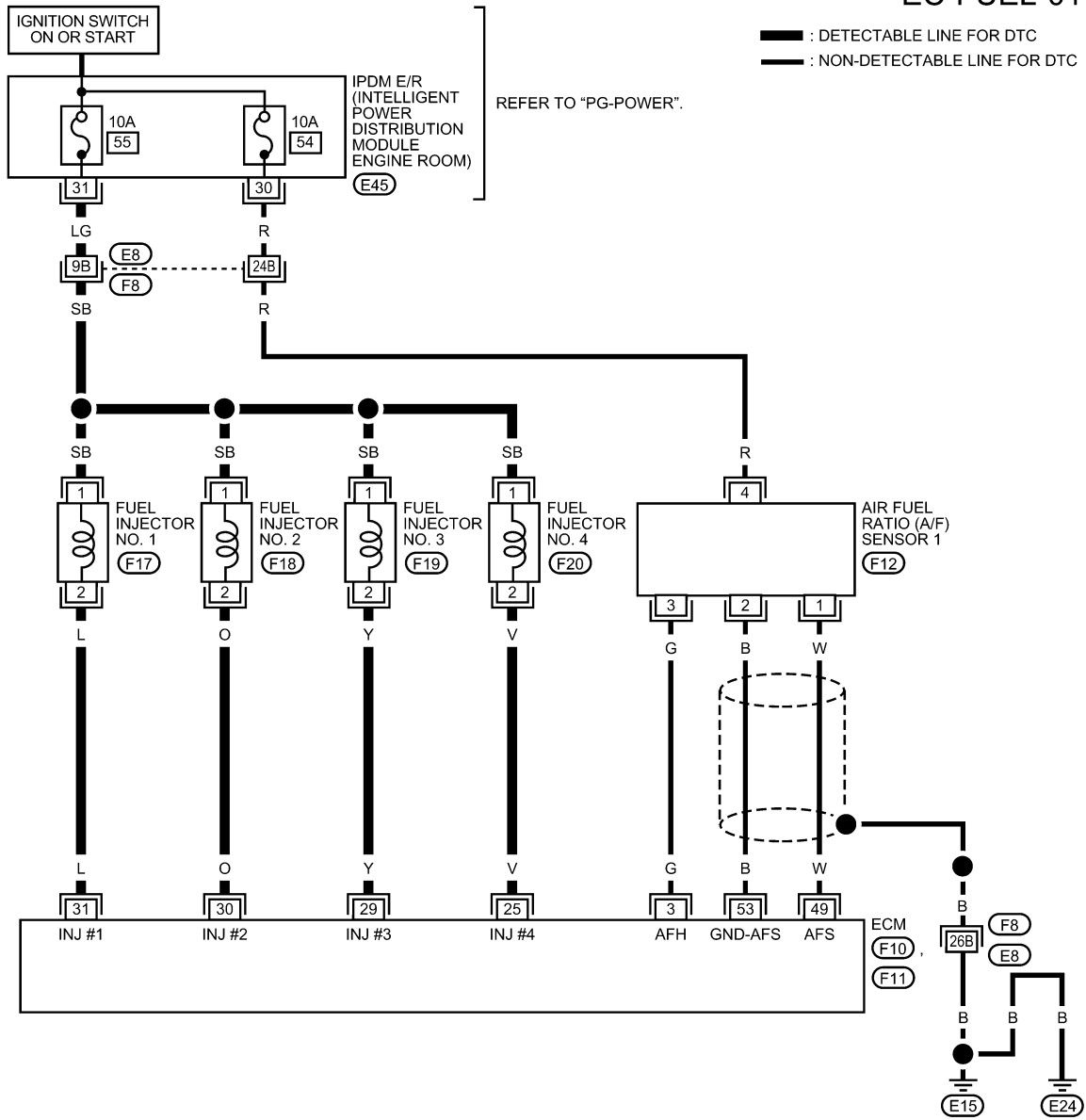
< SERVICE INFORMATION >

[MR18DE]

INFOID:000000005532603

Wiring Diagram

EC-FUEL-01



AABWA0321GB

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

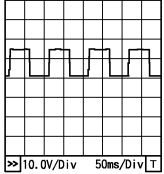
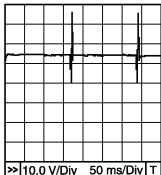
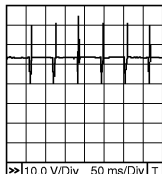
CAUTION:

DTC P0172 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

[MR18DE]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8 V★  <small>10.0V/Div 50ms/Div</small> PBIA8148J
25 29 30 31	V Y O L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14 V)★  <small>10.0 V/Div 50 ms/Div</small> PBIB0529E
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V)★  <small>10.0 V/Div 50 ms/Div</small> PBIA4943J
49	W	A/F sensor 1	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 1.8 V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	[Ignition switch: ON]	Approximately 2.2 V

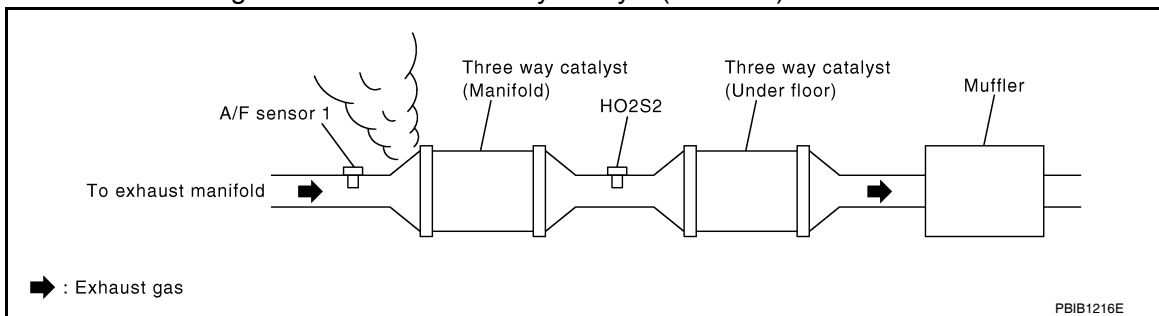
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005532604

1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

- OK >> GO TO 2.
- NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK

DTC P0172 FUEL INJECTION SYSTEM FUNCTION

[MR18DE]

< SERVICE INFORMATION >

Listen for an intake air leak after the mass air flow sensor.

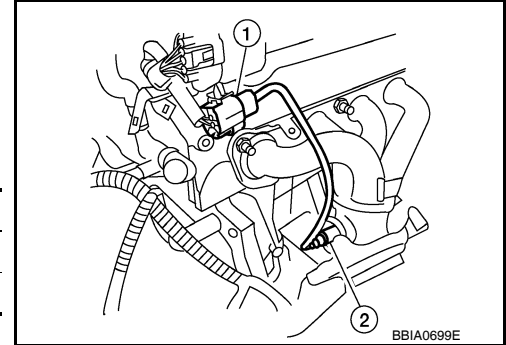
OK or NG

- OK >> GO TO 3.
- NG >> Repair or replace.

3. CHECK AIR FUEL RATIO (A/F) SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect air fuel ratio (A/F) sensor 1 harness connector (1).
 - Air fuel ratio (A/F) sensor 1 (2)
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	49
2	53



Continuity should exist.

5. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

- OK >> GO TO 4.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to [EC-582, "Fuel Pressure Check"](#).
2. Install fuel pressure gauge and check fuel pressure. Refer to [EC-582, "Fuel Pressure Check"](#).

At idling: Approximately 350 kPa (3.57 kg/cm², 51 psi)

OK or NG

- OK >> GO TO 6.
- NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to [EC-1014](#).)
- Fuel pressure regulator (Refer to [EC-582, "Fuel Pressure Check"](#).)

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III.

At idling : 1.0 - 4.0 g·m/sec

At 2,500 rpm : 2.0 - 10.0 g·m/sec

With GST

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check mass air flow sensor signal in Service \$01 with GST.

DTC P0172 FUEL INJECTION SYSTEM FUNCTION

[MR18DE]

< SERVICE INFORMATION >

At idling : 1.0 - 4.0 g-m/sec
At 2,500 rpm : 2.0 - 10.0 g-m/sec

OK or NG

OK >> GO TO 7.

NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to [EC-664](#).

7. CHECK FUNCTION OF FUEL INJECTORS

With CONSULT-III

1. Let engine idle.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-III

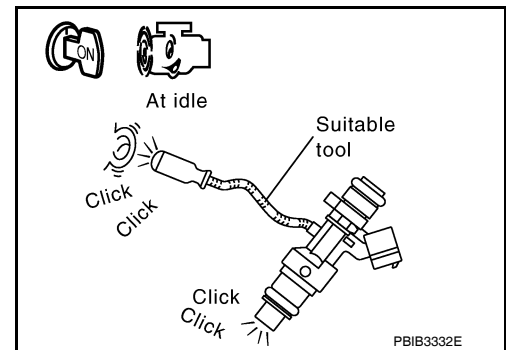
1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

OK or NG

OK >> GO TO 8.

NG >> Perform trouble diagnosis for [EC-1009](#).



8. CHECK FUEL INJECTOR

1. Remove fuel injector assembly. Refer to [EM-152](#).
Keep fuel hose and all fuel injector connected to fuel tube.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Reconnect all harness connectors disconnected.
4. Disconnect all injector harness connectors.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each fuel injector.
7. Crank engine for about 3 seconds.
Make sure fuel does not drip from fuel injector.

OK or NG

OK (Does not drip.)>>GO TO 9.

NG (Drips.)>>Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one.

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> INSPECTION END

DTC P0181 FTT SENSOR

< SERVICE INFORMATION >

[MR18DE]

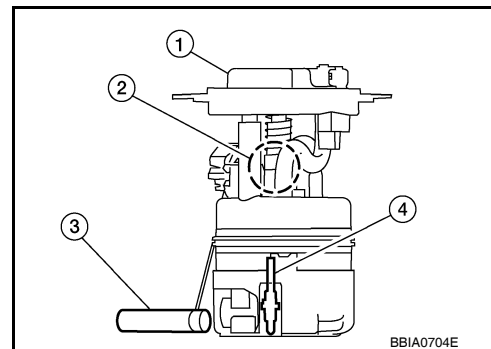
DTC P0181 FTT SENSOR

Component Description

INFOID:000000005532605

The fuel tank temperature sensor (4) is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel level sensor (3)



BBIA0704E

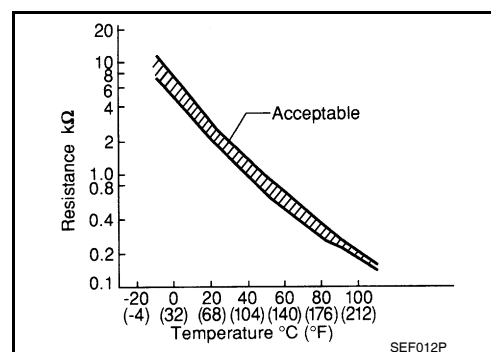
<Reference data>

Fluid temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: This data is reference values and is measured between ECM terminal 43 (Fuel tank temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result damage the ECM's transistor. Use ground other than ECM, such as ground.



SEF012P

On Board Diagnosis Logic

INFOID:000000005532606

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0181 0181	Fuel tank temperature sensor circuit range/performance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	<ul style="list-style-type: none"> • Harness or connectors (Fuel tank temperature sensor circuit is open or shorted) • Fuel tank temperature sensor

DTC Confirmation Procedure

INFOID:000000005532607

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check 1st trip DTC.
If 1st trip DTC is detected, go to [EC-771. "Diagnosis Procedure"](#).
If 1st trip DTC is not detected, go to following step.
3. Select "DATA MONITOR" mode with CONSULT-III.
4. Check "COOLAN TEMP/S" value.
If the "COOLAN TEMP/S" is less than 60°C (140°F), the result will be OK.
If the "COOLAN TEMP/S" is above 60°C (140°F), go to the following step.
5. Cool engine down until "COOLAN TEMP/S" signal is less than 60°C (140°F).
6. Wait at least 10 seconds.
7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to [EC-771. "Diagnosis Procedure"](#).

WITH GST

DTC P0181 FTT SENSOR

[MR18DE]

< SERVICE INFORMATION >

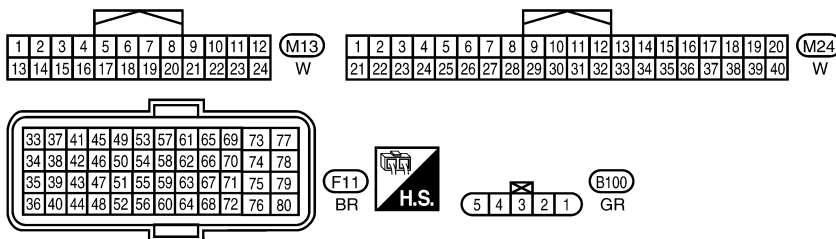
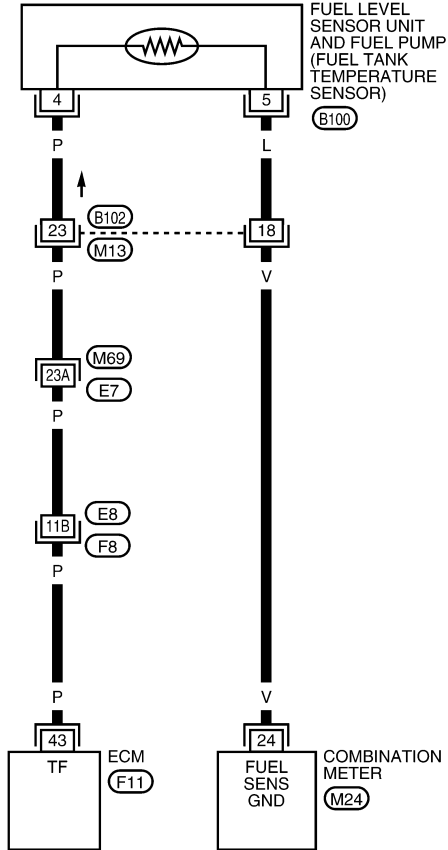
Follow the procedure "WITH CONSULT-III" above.

Wiring Diagram

INFOID:000000005532608

EC-FTTS-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
 (M69), (F8) - SUPER
 MULTIPLE JUNCTION (SMJ)

BBWA2636E

Diagnosis Procedure

INFOID:000000005532609

1. CHECK GROUND CONNECTIONS

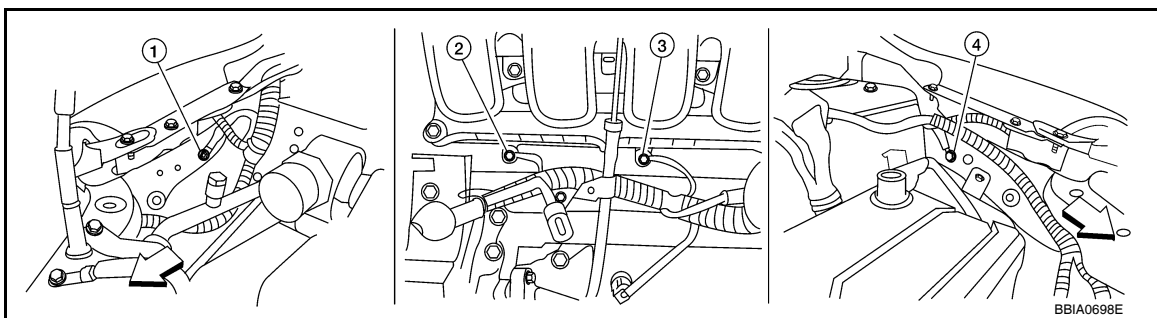
1. Turn ignition switch OFF.

DTC P0181 FTT SENSOR

[MR18DE]

< SERVICE INFORMATION >

- Loosen and retighten ground screw on the body.
Refer to [EC-638, "Ground Inspection"](#).



↶: Vehicle front

1. Body ground E24

2. Engine ground F9

3. Engine ground F16

4. Body ground E15

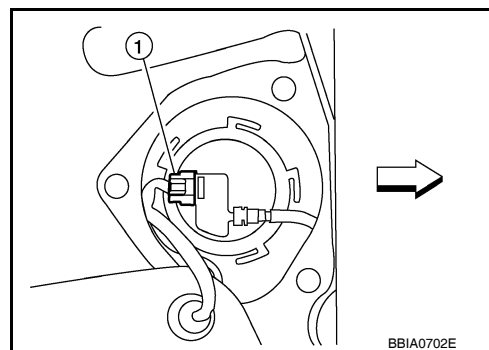
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect "fuel level sensor unit and fuel pump" harness connector (1).
- ↶: Vehicle front
- Turn ignition switch ON.



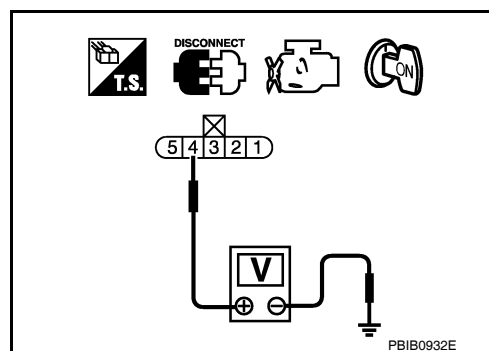
- Check voltage between "fuel level sensor unit and fuel pump" terminal 4 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V

OK or NG

OK >> GO TO 4.

NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between ECM and "fuel level sensor unit and fuel pump"

>> Repair open circuit or short to ground or short to power in harness or connector.

4. CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.

DTC P0181 FTT SENSOR

[MR18DE]

< SERVICE INFORMATION >

2. Disconnect combination meter harness connector.
3. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 5 and combination meter terminal 24. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 6.
- NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B102, M13
- Harness for open or short between “fuel level sensor unit and fuel pump” and ground.

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to, [EC-773. "Component Inspection"](#).

OK or NG

- OK >> GO TO 7.
- NG >> Replace “fuel level sensor unit and fuel pump”.

7. CHECK INTERMITTENT INCIDENT

Perform [EC-632](#).

>> **INSPECTION END**

Component Inspection

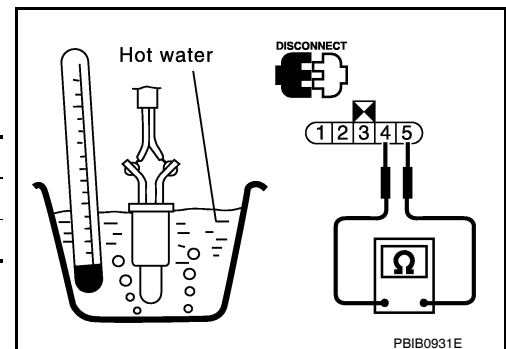
INFOID:000000005532610

FUEL TANK TEMPERATURE SENSOR

1. Check resistance between “fuel level sensor unit and fuel pump” terminal 4 and 5 by heating with hot water as shown in the figure.

Temperature [°C (°F)]	Resistance (kΩ)
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

2. If NG, replace “fuel level sensor unit and fuel pump”.



INFOID:000000005532611

Removal and Installation

FUEL TANK TEMPERATURE SENSOR

Refer to [FL-6. "Removal and Installation"](#).

DTC P0182, P0183 FTT SENSOR

< SERVICE INFORMATION >

[MR18DE]

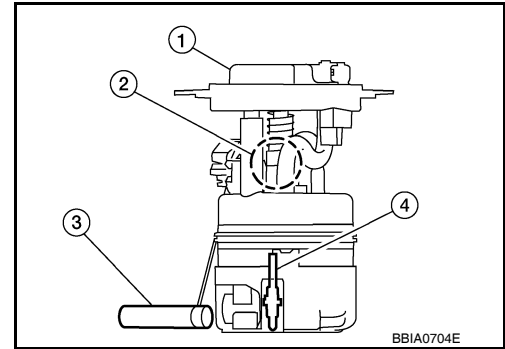
DTC P0182, P0183 FTT SENSOR

Component Description

INFOID:000000005532612

The fuel tank temperature sensor (4) is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel level sensor (3)



BBI A0704E

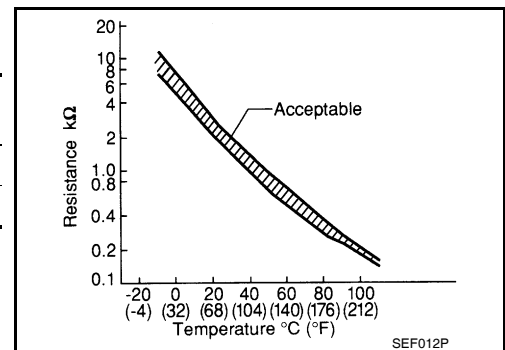
<Reference data>

Fluid temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: This data is reference values and is measured between ECM terminal 43 (Fuel tank temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result damage the ECM's transistor. Use ground other than ECM, such as ground.



SEF012P

On Board Diagnosis Logic

INFOID:000000005532613

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182 0182	Fuel tank temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (Fuel tank temperature sensor circuit is open or shorted.) • Fuel tank temperature sensor
P0183 0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

INFOID:000000005532614

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-775. "Diagnosis Procedure"](#).

DTC P0182, P0183 FTT SENSOR

< SERVICE INFORMATION >

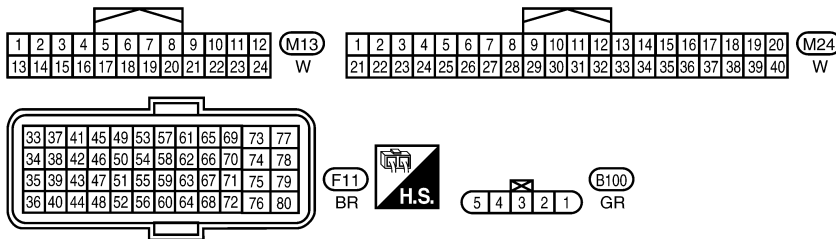
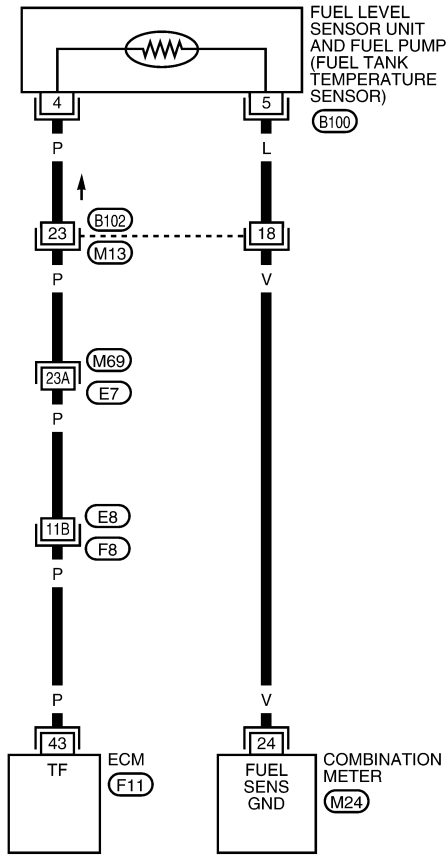
[MR18DE]

Wiring Diagram

INFOID:000000005532615

EC-FTTS-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
 (M69), (F8) - SUPER
 MULTIPLE JUNCTION (SMJ)

BBWA2636E

Diagnosis Procedure

INFOID:000000005532616

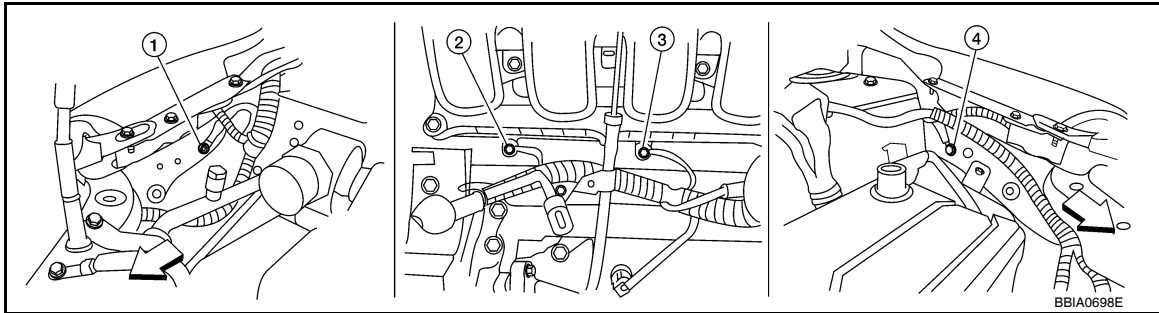
1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
 Refer to [EC-638, "Ground Inspection"](#).

DTC P0182, P0183 FTT SENSOR

< SERVICE INFORMATION >

[MR18DE]



↵: Vehicle front

1. Body ground E24

2. Engine ground F9

3. Engine ground F16

4. Body ground E15

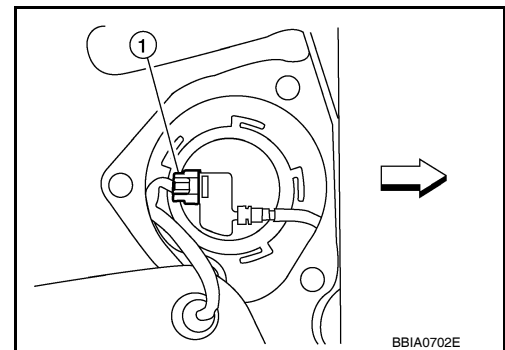
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect "fuel level sensor unit and fuel pump" harness connector (1).
- ↵: Vehicle front
3. Turn ignition switch ON.



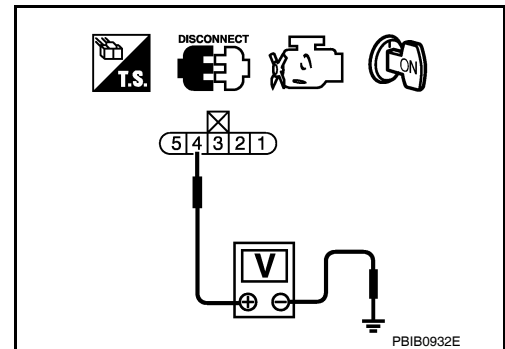
4. Check voltage between "fuel level sensor unit and fuel pump" terminal 4 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V

OK or NG

OK >> GO TO 4.

NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between ECM and "fuel level sensor unit and fuel pump"

>> Repair open circuit or short to ground or short to power in harness or connector.

4. CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect combination meter harness connector.

DTC P0182, P0183 FTT SENSOR

[MR18DE]

< SERVICE INFORMATION >

3. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 5 and combination meter terminal 24. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.

NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B102, M13
- Harness for open or short between “fuel level sensor unit and fuel pump” and ground.

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to, [EC-777, "Component Inspection"](#).

OK or NG

OK >> GO TO 7.

NG >> Replace “fuel level sensor unit and fuel pump”.

7. CHECK INTERMITTENT INCIDENT

Perform [EC-632](#).

>> **INSPECTION END**

Component Inspection

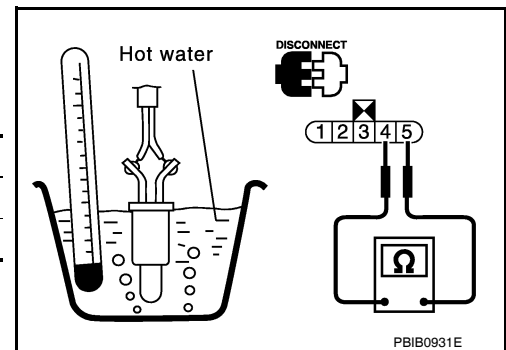
INFOID:000000005532617

FUEL TANK TEMPERATURE SENSOR

1. Check resistance between “fuel level sensor unit and fuel pump” terminal 4 and 5 by heating with hot water as shown in the figure.

Temperature [°C (°F)]	Resistance (kΩ)
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

2. If NG, replace “fuel level sensor unit and fuel pump”.



INFOID:000000005532618

Removal and Installation

FUEL TANK TEMPERATURE SENSOR

Refer to [FL-6, "Removal and Installation"](#).

DTC P0222, P0223 TP SENSOR

< SERVICE INFORMATION >

[MR18DE]

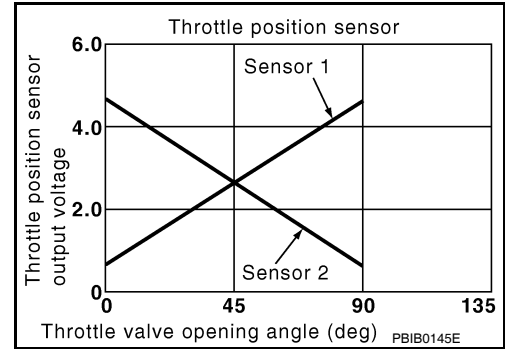
DTC P0222, P0223 TP SENSOR

Component Description

INFOID:000000005532619

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532620

Specification data are reference values.

Monitor item	Condition	Specification
TP SEN 1-B1 TP SEN 2-B1*	• Ignition switch: ON (Engine stopped) • Accelerator pedal: Fully released	More than 0.36 V
	• Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75 V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

INFOID:000000005532621

These self-diagnoses have the one trip detection logic.

NOTE:

If DTC P0222 or P0223 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-896](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (TP sensor 1 circuit is open or shorted.) (APP sensor 2 circuit is shorted.) • Electric throttle control actuator (TP sensor 1) • Accelerator pedal position sensor (APP sensor 2)
P0223 0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:000000005532622

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

1. Start engine and let it idle for 1 second.

DTC P0222, P0223 TP SENSOR

[MR18DE]

< SERVICE INFORMATION >

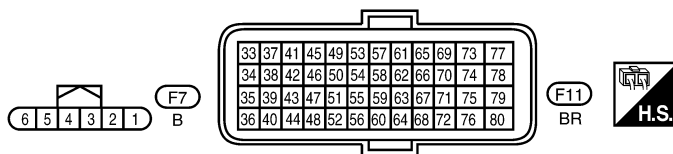
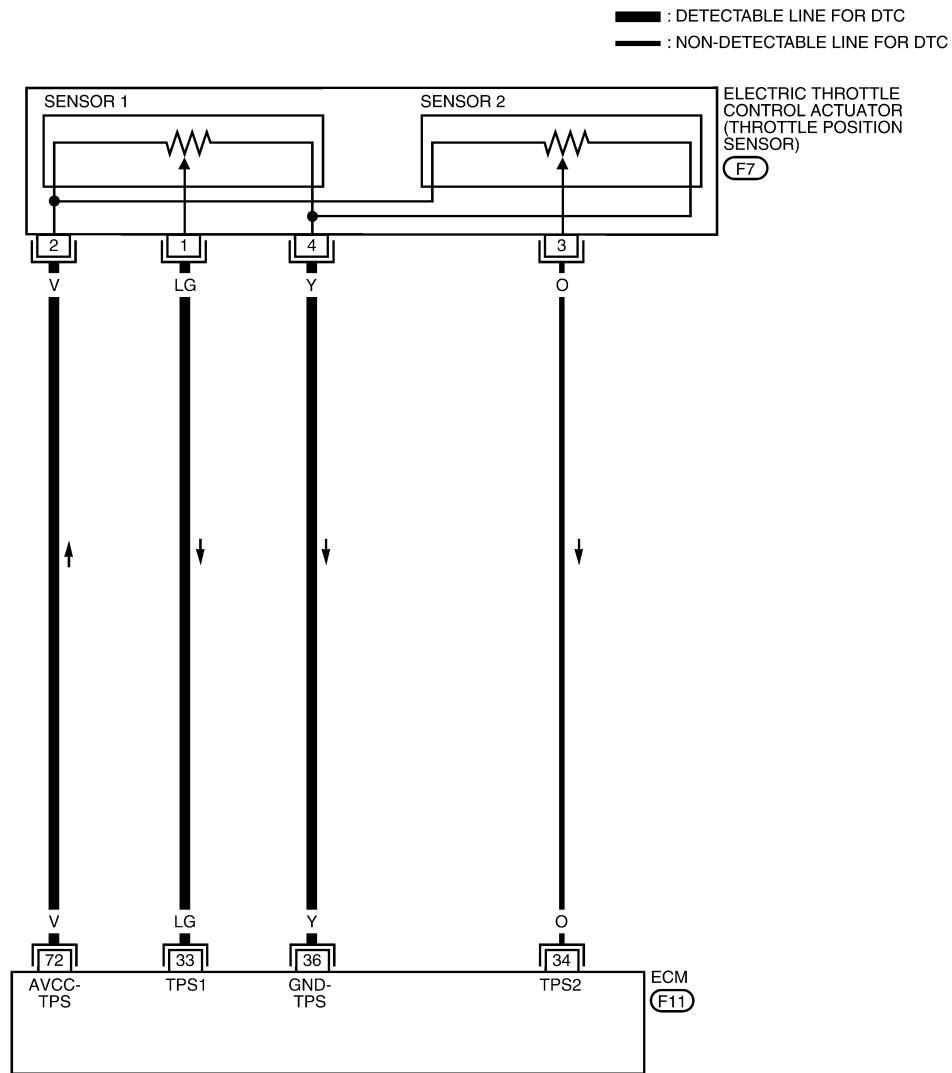
2. Check DTC.
3. If DTC is detected, go to [EC-780, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000005532623

EC-TPS1-01

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P



BBWA2655E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

DTC P0222, P0223 TP SENSOR

< SERVICE INFORMATION >

[MR18DE]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

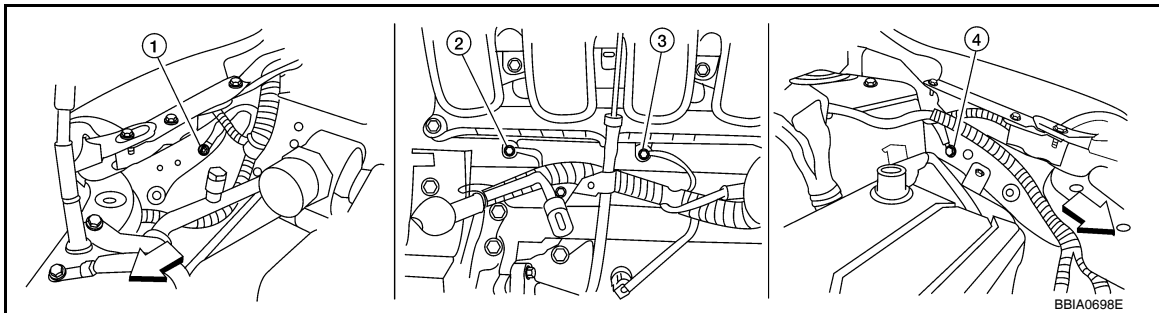
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	LG	Throttle position sensor 1	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36 V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75 V
34	O	Throttle position sensor 2	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75 V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36 V
36	Y	Sensor ground (Throttle position sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
72	V	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5 V

Diagnosis Procedure

INFOID:000000005532624

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
Refer to [EC-638. "Ground Inspection"](#).



↙: Vehicle front

- | | | |
|--------------------|---------------------|----------------------|
| 1. Body ground E24 | 2. Engine ground F9 | 3. Engine ground F16 |
| 4. Body ground E15 | | |

OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace ground connections.

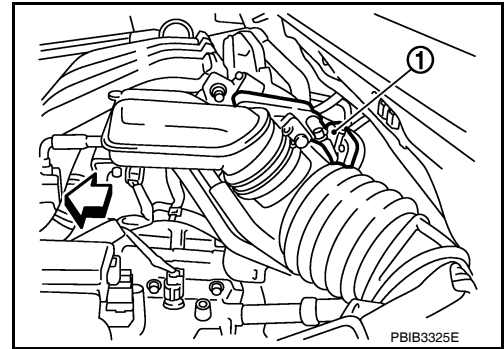
2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

DTC P0222, P0223 TP SENSOR

[MR18DE]

< SERVICE INFORMATION >

1. Disconnect electric throttle control actuator (1) harness connector.
 - ⇐: Vehicle front
2. Turn ignition switch ON.

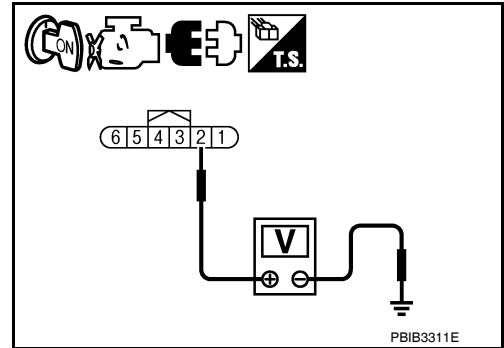


3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V

OK or NG

- OK >> GO TO 3.
- NG >> Repair open circuit or short to ground or short to power in harness connectors.



3.CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 36 and electric throttle control actuator terminal 4. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground or short to power.

OK or NG

- OK >> GO TO 4.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 33 and electric throttle control actuator terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to [EC-782. "Component Inspection"](#).

OK or NG

- OK >> GO TO 7.
- NG >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-580. "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-580. "Idle Air Volume Learning"](#).

DTC P0222, P0223 TP SENSOR

[MR18DE]

< SERVICE INFORMATION >

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> INSPECTION END

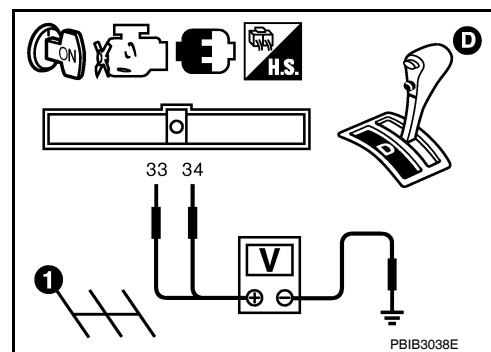
Component Inspection

INFOID:000000005532625

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
3. Turn ignition switch ON.
4. Set shift lever to D position (A/T, CVT) or 1st position (M/T).
5. Check voltage between ECM terminals 33 (TP sensor 1 signal), 34 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
33 (Throttle position sensor 1)	Fully released	More than 0.36 V
	Fully depressed	Less than 4.75 V
34 (Throttle position sensor 2)	Fully released	Less than 4.75 V
	Fully depressed	More than 0.36 V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
8. Perform [EC-580, "Idle Air Volume Learning"](#).

Removal and Installation

INFOID:000000005532626

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-137, "Removal and Installation"](#).

DTC P0300 - P0304 MULTIPLE CYLINDER MISFIRE, NO. 1 - 4 CYLINDER MISFIRE

< SERVICE INFORMATION >

[MR18DE]

DTC P0300 - P0304 MULTIPLE CYLINDER MISFIRE, NO. 1 - 4 CYLINDER MISFIRE

On Board Diagnosis Logic

INFOID:000000005532627

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

- One Trip Detection Logic (Three Way Catalyst Damage)**
 On the 1st trip, when a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
 When a misfire condition occurs, the ECM monitors the CKP sensor (POS) signal every 200 engine revolutions for a change.
 When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
 If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
 When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
 If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
- Two Trip Detection Logic (Exhaust quality deterioration)**
 For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
 A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300 0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	<ul style="list-style-type: none"> • Improper spark plug • Insufficient compression • Incorrect fuel pressure • Fuel injector circuit is open or shorted • Fuel injector • Intake air leak • The ignition signal circuit is open or shorted • Lack of fuel • Drive plate or flywheel • Air fuel ratio (A/F) sensor 1 • Incorrect PCV hose connection
P0301 0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302 0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303 0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304 0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	

DTC Confirmation Procedure

INFOID:000000005532628

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Restart engine and let it idle for about 15 minutes.
- Check 1st trip DTC.
- If 1st trip DTC is detected, go to [EC-784, "Diagnosis Procedure"](#).

NOTE:

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to table below.

DTC P0300 - P0304 MULTIPLE CYLINDER MISFIRE, NO. 1 - 4 CYLINDER MISFIRE

< SERVICE INFORMATION >

[MR18DE]

Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following condition should be satisfied at the same time:

Engine speed	Engine speed in the freeze frame data \pm 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data \pm 10 km/h (6 MPH)
Basic fuel schedule	Basic fuel schedule in the freeze frame data \times (1 \pm 0.1)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F)
	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F)

The time to driving varies according to the engine speed in the freeze frame data.
Refer to the following table.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

Diagnosis Procedure

INFOID:000000005532629

1. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
3. Check PCV hose connection.

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

OK or NG

- OK >> GO TO 3.
NG >> Repair or replace.

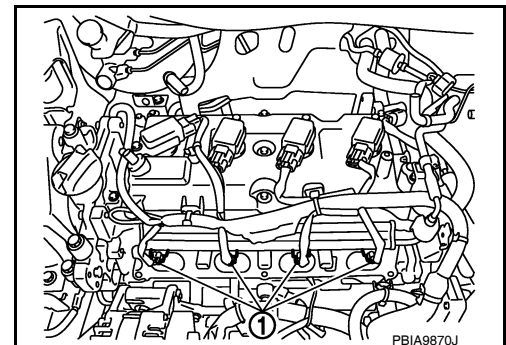
3. PERFORM POWER BALANCE TEST

With CONSULT-III

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

Without CONSULT-III

When disconnecting each fuel injector (1) harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?



Yes or No

DTC P0300 - P0304 MULTIPLE CYLINDER MISFIRE, NO. 1 - 4 CYLINDER MISFIRE

[MR18DE]

< SERVICE INFORMATION >

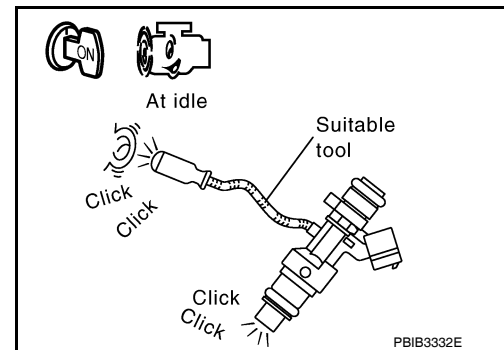
- Yes >> GO TO 4.
- No >> GO TO 9.

4. CHECK FUEL INJECTOR

Does each fuel injector make an operating sound at idle?

Yes or No

- Yes >> GO TO 5.
- No >> Check fuel injector(s) and circuit(s). Refer to [EC-1009](#).



5. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

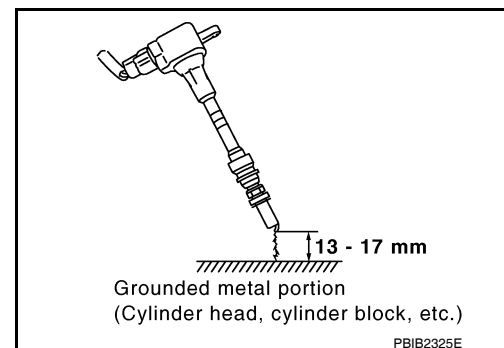
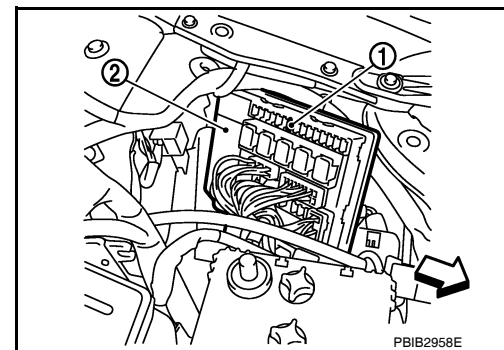
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

NOTE:

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- ⇐: Vehicle front
3. Start engine.
 4. After engine stalls, crank it two or three times to release all fuel pressure.
 5. Turn ignition switch OFF.
 6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
 7. Remove ignition coil and spark plug of the cylinder to be checked.
 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
 9. Connect spark plug and harness connector to ignition coil.
 10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
 11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- Do not approach to the spark plug and the ignition coil within 50 cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.

NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

OK or NG

- OK >> GO TO 9.
- NG >> GO TO 6.

6. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.

DTC P0300 - P0304 MULTIPLE CYLINDER MISFIRE, NO. 1 - 4 CYLINDER MISFIRE

[MR18DE]

< SERVICE INFORMATION >

3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

OK or NG

OK >> GO TO 7.

NG >> Check ignition coil, power transistor and their circuits. Refer to [EC-1019](#).

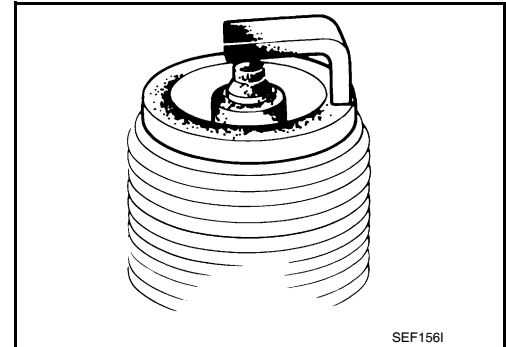
7. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

OK or NG

OK >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-223, "Standard and Limit"](#).

NG >> 1. Repair or clean spark plug.
2. GO TO 8.



8. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

OK or NG

OK >> **INSPECTION END**

NG >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-223, "Standard and Limit"](#).

9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to [EM-181, "On-Vehicle Service"](#).

OK or NG

OK >> GO TO 10.

NG >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to [EC-582, "Fuel Pressure Check"](#).
3. Install fuel pressure gauge and check fuel pressure. Refer to [EC-582, "Fuel Pressure Check"](#).

At idling: Approximately 350 kPa (3.57 kg/cm², 51 psi)

OK or NG

OK >> GO TO 12.

NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to [EC-1014](#).)
- Fuel pressure regulator (Refer to [EC-582, "Fuel Pressure Check"](#).)
- Fuel lines (Refer to [FL-5, "Checking Fuel Line"](#).)
- Fuel filter for clogging

>> Repair or replace.

DTC P0300 - P0304 MULTIPLE CYLINDER MISFIRE, NO. 1 - 4 CYLINDER MISFIRE

< SERVICE INFORMATION >

[MR18DE]

12. CHECK IGNITION TIMING

Check the following items. Refer to [EC-574. "Basic Inspection"](#).

Items	Specifications
Target idle speed	A/T: 700 ± 50 rpm (in P or N position)
	CVT: 700 ± 50 rpm (in P or N position)
	M/T: 700 ± 50 rpm (in Neutral position)
Ignition timing	A/T: 13 ± 5° BTDC (in P or N position)
	CVT: 13 ± 5° BTDC (in Neutral position)
	M/T: 13 ± 5° BTDC (in Neutral position)

OK or NG

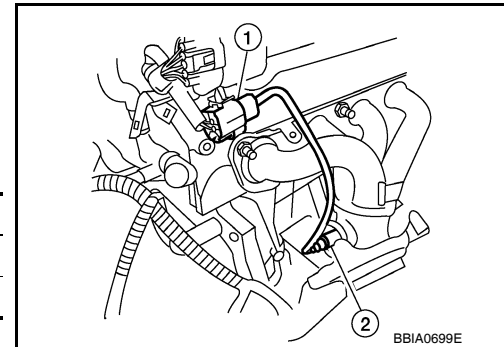
OK >> GO TO 13.

NG >> Follow the [EC-574. "Basic Inspection"](#).

13. CHECK AIR FUEL RATIO (A/F) SENSOR 1 CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect air fuel ratio (A/F) sensor 1 harness connector (1).
- Air fuel ratio (A/F) sensor 1 (2)
- Disconnect ECM harness connector.
- Check harness continuity between the following terminals.
Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	49
2	53



Continuity should exist.

- Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground.
Refer to Wiring Diagram.

Continuity should not exist.

- Also check harness for short to power.

OK or NG

OK >> GO TO 14.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to [EC-652. "Component Inspection"](#).

OK or NG

OK >> GO TO 16.

NG >> GO TO 15.

15. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

16. CHECK MASS AIR FLOW SENSOR

DTC P0300 - P0304 MULTIPLE CYLINDER MISFIRE, NO. 1 - 4 CYLINDER MISFIRE

[MR18DE]

< SERVICE INFORMATION >

Ⓜ With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT-III.

At idling : 1.0 - 4.0 g·m/sec
At 2,500 rpm : 2.0 - 10.0 g·m/sec

Ⓜ With GST

1. Start engine and warm it up to normal operating temperature.
2. Check mass air flow sensor signal in Service \$01 with GST.

At idling : 1.0 - 4.0 g·m/sec
At 2,500 rpm : 2.0 - 10.0 g·m/sec

OK or NG

OK >> GO TO 17.

NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to [EC-664](#).

17. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in [EC-592, "Symptom Matrix Chart"](#).

OK or NG

OK >> GO TO 18.

NG >> Repair or replace.

18. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.

Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to [EC-542, "Emission-related Diagnostic Information"](#).

>> GO TO 19.

19. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

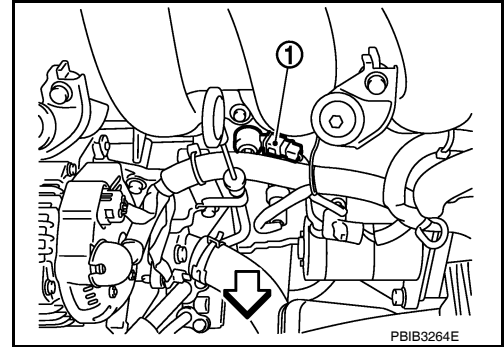
DTC P0327, P0328 KS

Component Description

INFOID:000000005532630

The knock sensor (1) is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

- ⇐: Vehicle front



On Board Diagnosis Logic

INFOID:000000005532631

The MIL will not light up for these self-diagnoses.

DTC No.	Trouble Diagnosis Name	DTC Detected Condition	Possible Cause
P0327 0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (Knock sensor circuit is open or shorted.) • Knock sensor
P0328 0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

INFOID:000000005532632

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

1. Start engine and run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-791. "Diagnosis Procedure"](#).

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

DTC P0327, P0328 KS

< SERVICE INFORMATION >

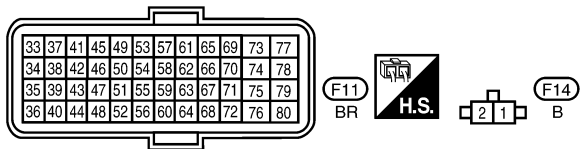
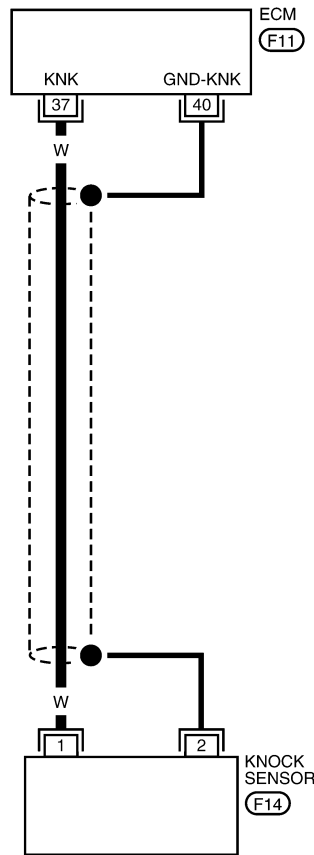
[MR18DE]

Wiring Diagram

INFOID:000000005532633

EC-KS-01

: DETECTABLE LINE FOR DTC
 : NON-DETECTABLE LINE FOR DTC



BBWA2637E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
37	W	Knock sensor	[Engine is running] • Idle speed	Approximately 2.5 V
40	—	Sensor ground (Knock sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V

A

EC

C

Diagnosis Procedure

INFOID:000000005532634

1. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-I

D

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminal 37 and ground. Refer to Wiring Diagram.

E

NOTE:

It is necessary to use an ohmmeter which can measure more than 10 MΩ.

F

Resistance: Approximately 532 - 588 kΩ [at 20°C (68°F)]

4. Also check harness for short to ground and short to power.

G

OK or NG

- OK >> GO TO 4.
- NG >> GO TO 2.

2. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-II

H

1. Disconnect knock sensor (1) harness connector.
- ⇐: Vehicle front
2. Check harness continuity between ECM terminal 37 and knock sensor terminal 1. Refer to Wiring Diagram.

I

Continuity should exist.

3. Also check harness for short to ground and short to power.

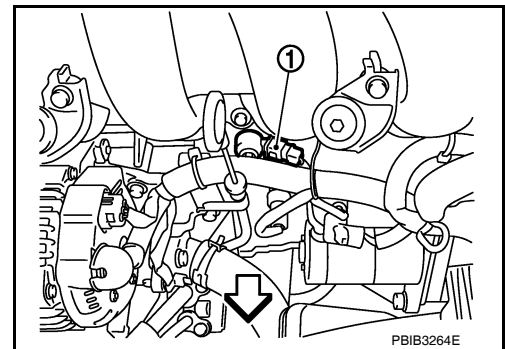
J

OK or NG

- OK >> GO TO 3.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

K

L



3. CHECK KNOCK SENSOR

Refer to [EC-792, "Component Inspection"](#).

M

OK or NG

- OK >> GO TO 6.
- NG >> Replace knock sensor.

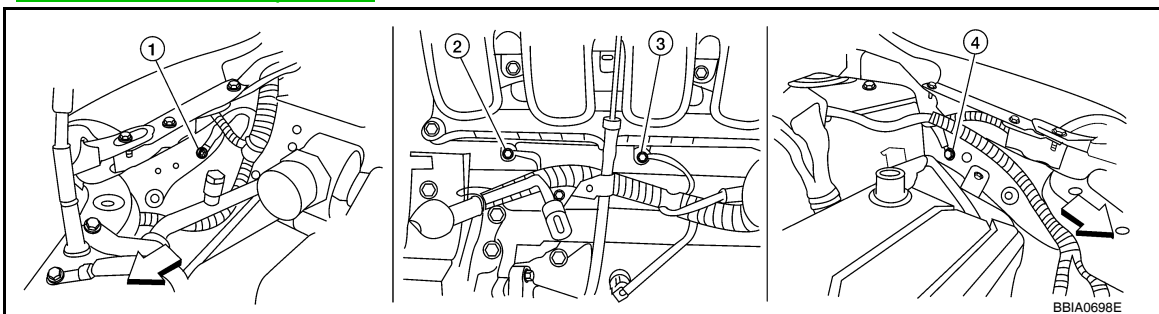
N

4. CHECK GROUND CONNECTIONS

Loosen and retighten ground screws on the body.

Refer to [EC-638, "Ground Inspection"](#).

O



P

< SERVICE INFORMATION >

↶ Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

- OK >> GO TO 5.
 NG >> Repair or replace ground connections.

5. CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Reconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 40 and knock sensor terminal 2.
 Refer to Wiring Diagram.

Continuity should exist

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 6.
 NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005532635

KNOCK SENSOR

1. Check resistance between knock sensor terminal 1 and ground.

NOTE:

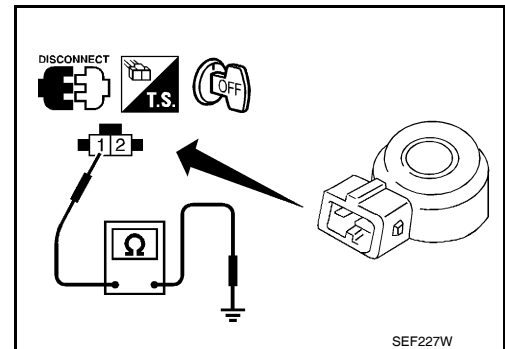
It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistance: Approximately 532 - 588 kΩ [at 20°C (68°F)]

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

2. If NG, replace knock sensor.



INFOID:000000005532636

Removal and Installation

KNOCK SENSOR

Refer to [EM-195, "Component"](#).

DTC P0335 CKP SENSOR (POS)

< SERVICE INFORMATION >

[MR18DE]

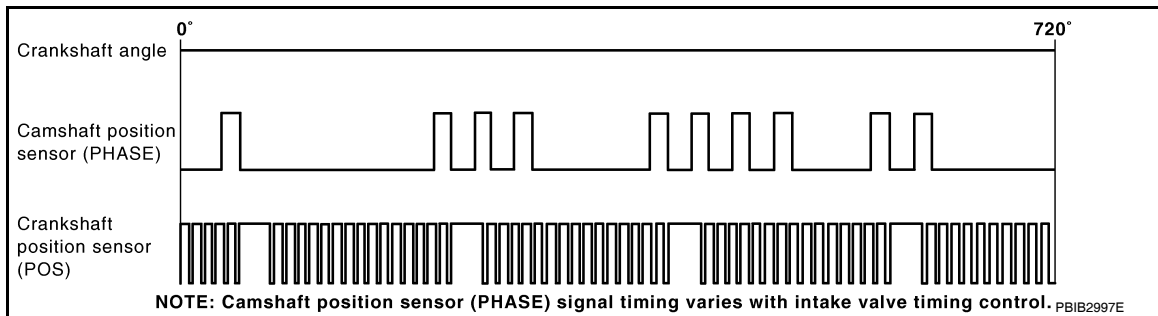
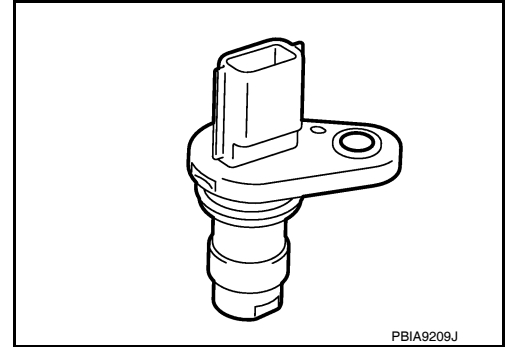
DTC P0335 CKP SENSOR (POS)

Component Description

INFOID:000000005532637

The crankshaft position sensor (POS) is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution. The sensor consists of a permanent magnet and Hall IC. When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes. The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

ECM receives the signals as shown in the figure.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532638

Specification data are reference values.

Monitor item	Condition	Specification
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

INFOID:000000005532639

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	Crankshaft position sensor (POS) circuit	<ul style="list-style-type: none"> • The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor (POS) signal is not in the normal pattern during engine running. 	<ul style="list-style-type: none"> • Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) • Crankshaft position sensor (POS) • Accelerator pedal position sensor • Refrigerant pressure sensor • EVAP control system pressure sensor • Signal plate

DTC Confirmation Procedure

INFOID:000000005532640

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

DTC P0335 CKP SENSOR (POS)

[MR18DE]

< SERVICE INFORMATION >

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

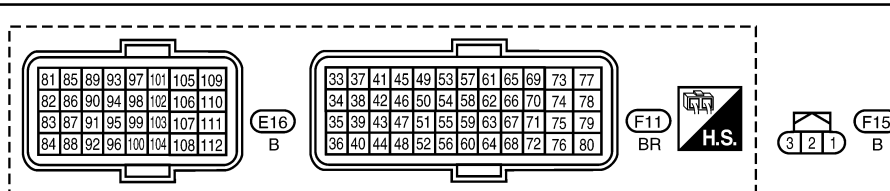
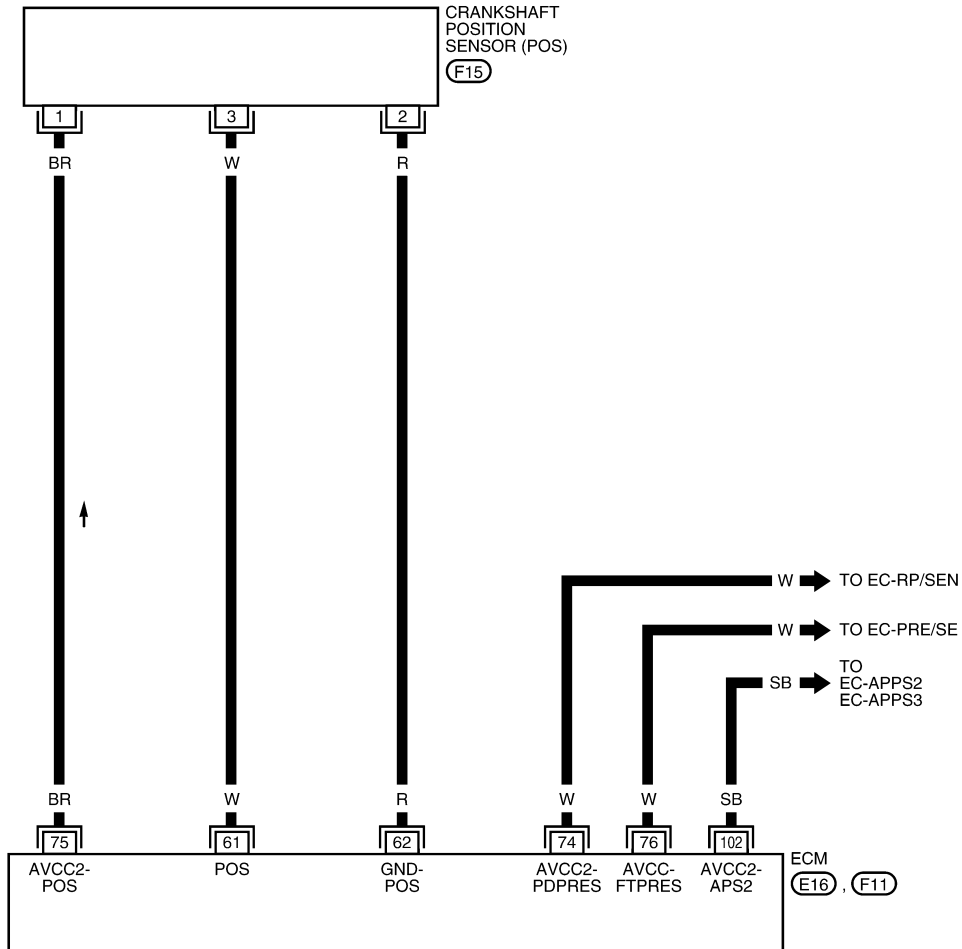
1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-795, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000005532641

EC-POS-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA3071E

DTC P0335 CKP SENSOR (POS)

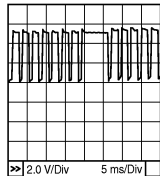
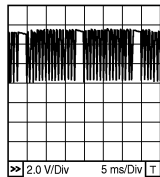
< SERVICE INFORMATION >

[MR18DE]

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
61	W	Crankshaft position sensor (POS)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	Approximately 4.0 V★  PBIB2998E
			[Engine is running] • Engine speed: 2,000 rpm	Approximately 4.0 V★  PBIB2999E
62	R	Sensor ground [Crankshaft position sensor (POS)]	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
74	W	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	Approximately 5 V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	[Ignition switch: ON]	Approximately 5 V
76	W	EVAP control system pressure sensor power supply	[Ignition switch: ON]	Approximately 5 V
102	SB	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5 V

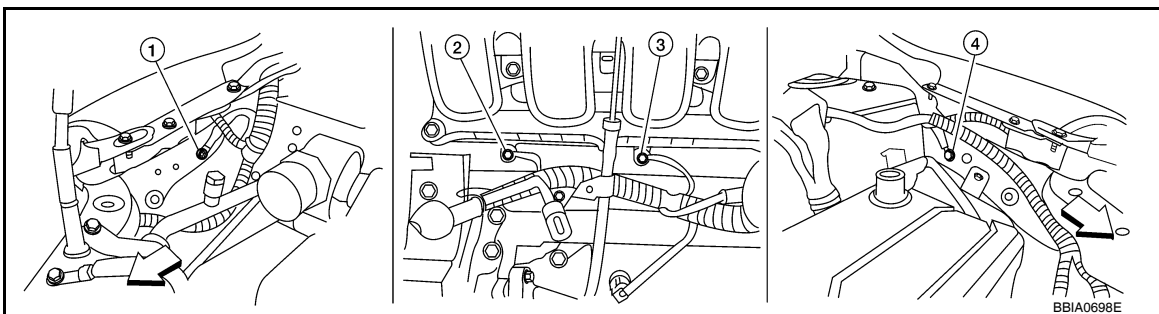
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005532642

1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body.
Refer to [EC-638, "Ground Inspection"](#).



DTC P0335 CKP SENSOR (POS)

[MR18DE]

< SERVICE INFORMATION >

↶ Vehicle front

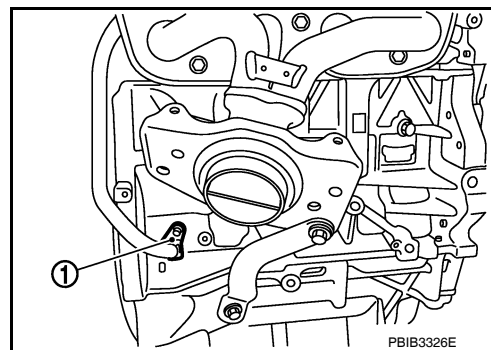
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-I

1. Disconnect crankshaft position (CKP) sensor (POS) (1) harness connector.
2. Turn ignition switch ON.

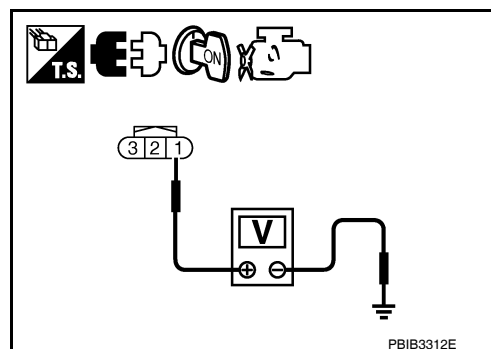


3. Check voltage between CKP sensor (POS) terminal 1 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V

OK or NG

- OK >> GO TO 8.
NG >> GO TO 3.



3. CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between CKP sensor (POS) terminal 1 and ECM terminal 75. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit.

4. CHECK COMPONENTS POWER SUPPLY

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
74	Refrigerant pressure sensor terminal 3	EC-1029, "Wiring Diagram"
75	Crankshaft position sensor (POS) terminal 1	EC-794, "Wiring Diagram"
76	EVAP control system pressure sensor terminal 3	EC-853, "Wiring Diagram"
102	APP sensor terminal 5	EC-972, "Wiring Diagram"

OK or NG

- OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

DTC P0335 CKP SENSOR (POS)

[MR18DE]

< SERVICE INFORMATION >

5. CHECK COMPONENTS

Check the following.

- Refrigerant pressure sensor. (Refer to [EC-1030](#).)
- EVAP control system pressure sensor. (Refer to [EC-850](#).)

OK or NG

- OK >> GO TO 6.
- NG >> Replace malfunctioning components.

6. CHECK APP SENSOR

Refer to [EC-969, "Component Inspection"](#).

OK or NG

- OK >> GO TO 8.
- NG >> GO TO 7.

7. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-580, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

8. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between CKP sensor (POS) terminal 2 and ECM terminal 62.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 9.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between CKP sensor (POS) terminal 3 and ECM terminal 61.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 10.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to [EC-798, "Component Inspection"](#).

OK or NG

- OK >> GO TO 11.
- NG >> Replace crankshaft position sensor (POS).

11. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

- OK >> GO TO 12.
- NG >> Replace the signal plate.

DTC P0335 CKP SENSOR (POS)

[MR18DE]

< SERVICE INFORMATION >

12. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

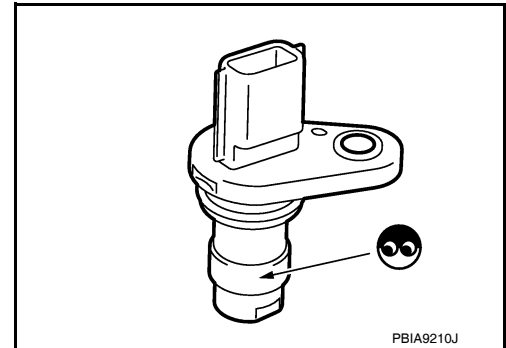
>> **INSPECTION END**

Component Inspection

INFOID:000000005532643

CRANKSHAFT POSITION SENSOR (POS)

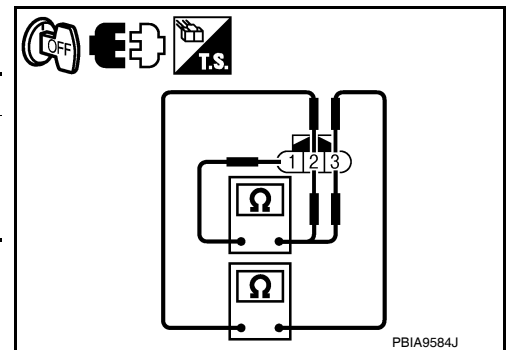
1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor (POS) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞ Ω
1 (+) - 3 (-)	
2 (+) - 3 (-)	

6. If NG, replace crankshaft position sensor (POS).



Removal and Installation

INFOID:000000005532644

CRANKSHAFT POSITION SENSOR (POS)

Refer to [EM-195](#), "Component".

DTC P0340 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

[MR18DE]

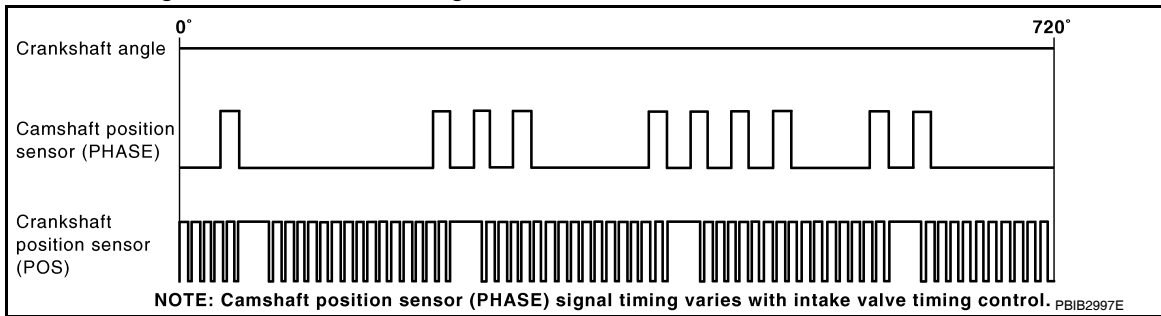
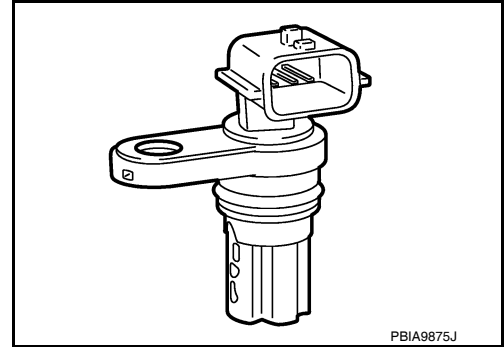
DTC P0340 CMP SENSOR (PHASE)

Component Description

INFOID:000000005532645

The camshaft position sensor (PHASE) senses the protrusion of camshaft (INT) to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position. When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals. The sensor consists of a permanent magnet and Hall IC. When engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes.

ECM receives the signals as shown in the figure.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532646

Specification data are reference values.

Monitor item	Condition	Specification
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

INFOID:000000005532647

NOTE:

If DTC P0340 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-896](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340	Camshaft position sensor (PHASE) circuit	<ul style="list-style-type: none"> The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. The cylinder No. signal is not set to ECM during engine running. The cylinder No. signal is not in the normal pattern during engine running. 	<ul style="list-style-type: none"> Harness or connectors [Camshaft position sensor (PHASE) circuit is open or shorted.] Camshaft position sensor (PHASE) Camshaft (INT) Starter motor Starting system circuit Dead (Weak) battery

DTC Confirmation Procedure

INFOID:000000005532648

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.

DTC P0340 CMP SENSOR (PHASE)

[MR18DE]

< SERVICE INFORMATION >

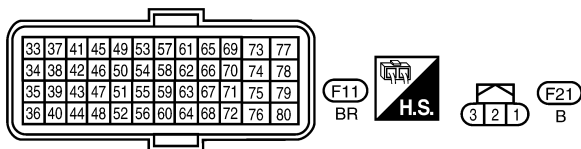
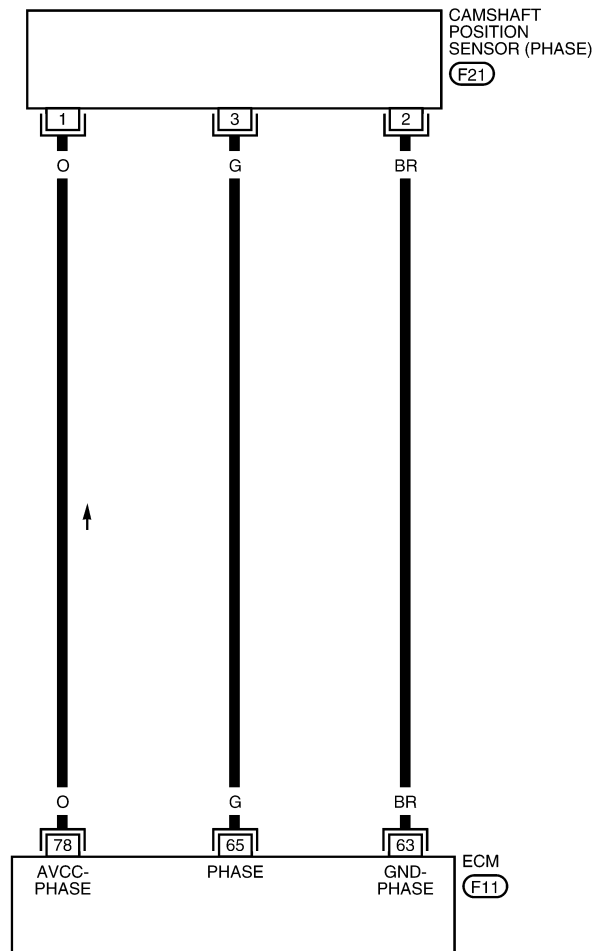
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-801, "Diagnosis Procedure"](#).
If 1st trip DTC is not detected, go to next step.
4. Maintain engine speed at more than 800 rpm for at least 5 seconds.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-801, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000005532649

EC-PHASE-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



BBWA2639E

DTC P0340 CMP SENSOR (PHASE)

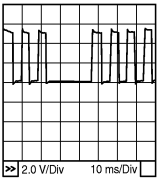
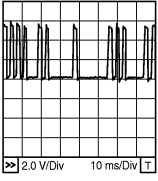
[MR18DE]

< SERVICE INFORMATION >

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	BR	Sensor ground [Camshaft position sensor (PHASE)]	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
65	G	Camshaft position sensor (PHASE)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	1.0 - 2.0 V★ 
			[Engine is running] • Engine speed: 2,000 rpm	1.0 - 2.0 V★ 
78	O	Sensor power supply [Camshaft position sensor (PHASE)]	[Ignition switch: ON]	Approximately 5 V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000005532650

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over?

Does the starter motor operate?

Yes or No

Yes >> GO TO 2.

No >> Check starting system. (Refer to [SC-16, "Trouble Diagnosis with Multitasking Battery Diagnostic Station"](#).)

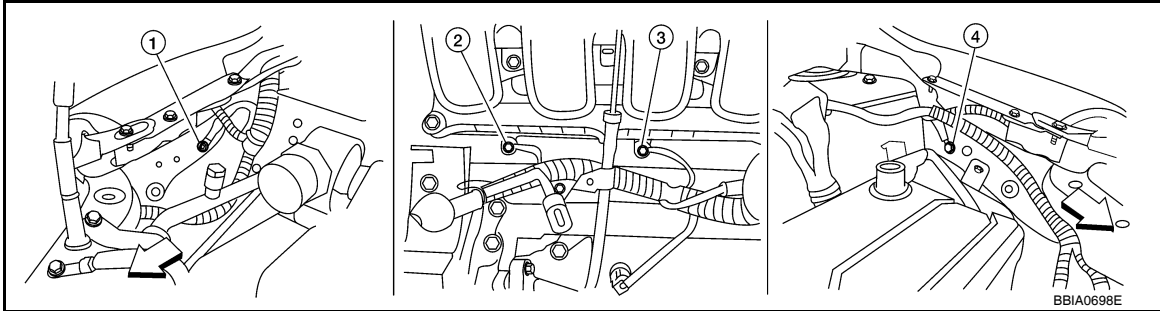
2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
Refer to [EC-638, "Ground Inspection"](#).

DTC P0340 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

[MR18DE]



↵: Vehicle front

1. Body ground E24

2. Engine ground F9

3. Engine ground F16

4. Body ground E15

OK or NG

OK >> GO TO 3.

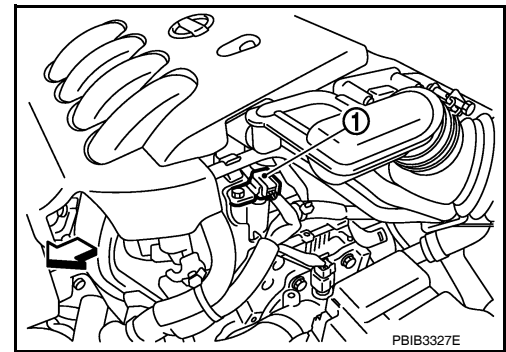
NG >> Repair or replace ground connections.

3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) (1) harness connector.

- ↵: Vehicle front

2. Turn ignition switch ON.



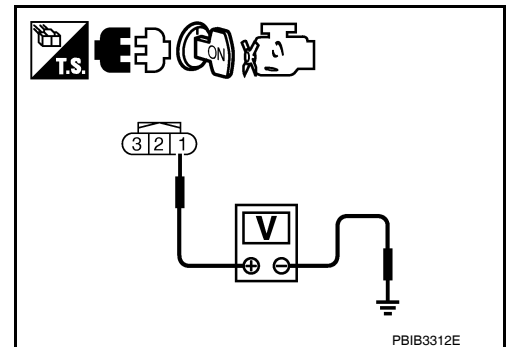
3. Check voltage between CMP sensor (PHASE) terminal 1 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V

OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.



4. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check harness continuity between CMP sensor (PHASE) terminal 2 and ECM terminal 63. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

DTC P0340 CMP SENSOR (PHASE)

[MR18DE]

< SERVICE INFORMATION >

1. Check harness continuity between CMP sensor (PHASE) terminal 3 and ECM terminal 65.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-803. "Component Inspection"](#).

OK or NG

OK >> GO TO 7.

NG >> Replace camshaft position sensor (PHASE).

7. CHECK CAMSHAFT (INTAKE)

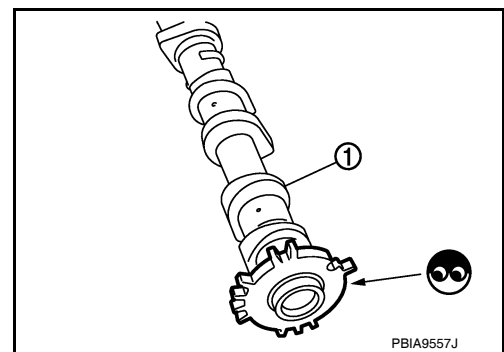
Check the following.

- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 8.

NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



8. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

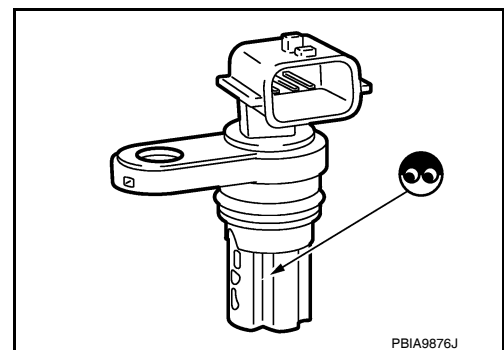
>> INSPECTION END

Component Inspection

INFOID:000000005532651

CAMSHAFT POSITION SENSOR (PHASE)

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor (PHASE) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



DTC P0340 CMP SENSOR (PHASE)

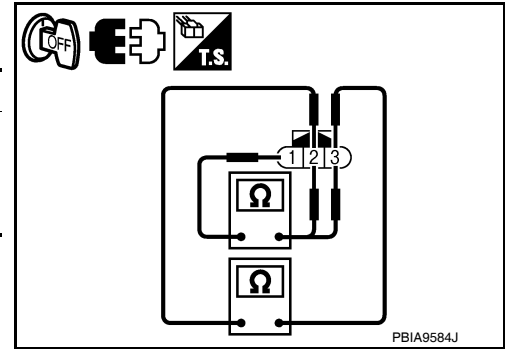
[MR18DE]

< SERVICE INFORMATION >

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞ Ω
1 (+) - 3 (-)	
2 (+) - 3 (-)	

6. If NG, replace camshaft position sensor (PHASE).



INFOID:000000005532652

Removal and Installation

CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EM-166](#). "Component".

DTC P0420 THREE WAY CATALYST FUNCTION

< SERVICE INFORMATION >

[MR18DE]

DTC P0420 THREE WAY CATALYST FUNCTION

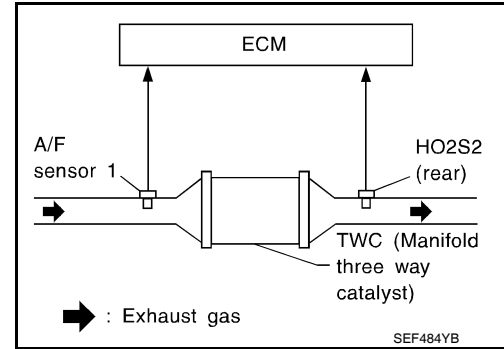
On Board Diagnosis Logic

INFOID:000000005532653

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2.

A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.

When the frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420 0420	Catalyst system efficiency below threshold	<ul style="list-style-type: none"> • Three way catalyst (manifold) does not operate properly. • Three way catalyst (manifold) does not have enough oxygen storage capacity. 	<ul style="list-style-type: none"> • Three way catalyst (manifold) • Exhaust tube • Intake air leaks • Fuel injector • Fuel injector leaks • Spark plug • Improper ignition timing

DTC Confirmation Procedure

INFOID:000000005532654

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

TESTING CONDITION:

Do not hold engine speed for more than the specified minutes below.

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-III.
9. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
If "INCMP" of "CATALYST" changed to "CMPLT", go to step 12.
10. Wait 5 seconds at idle.
11. Rev engine up to 2,000 to 3,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take approximately 5 minutes).
If not "CMPLT", stop engine and cool it down to less than 70°C (158°F) and then retest from step 1.
12. Check 1st trip DTC.
If 1st trip DTC is detected, go to [EC-806, "Diagnosis Procedure"](#).

Overall Function Check

INFOID:000000005532655

Use this procedure to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

DTC P0420 THREE WAY CATALYST FUNCTION

[MR18DE]

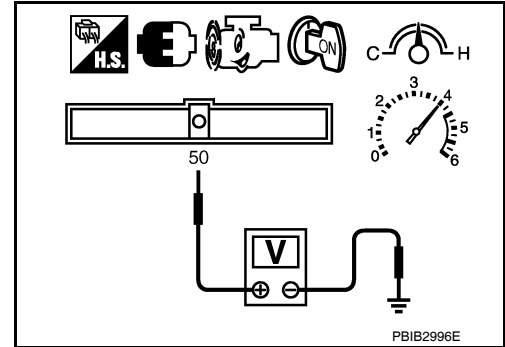
< SERVICE INFORMATION >

WITH GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Set voltmeter probe between ECM terminals 50 (HO2S2 signal) and ground.
7. Keep engine speed at 2,500 rpm constant under no load.
8. Make sure that the voltage does not vary for more than 5 seconds.

If the voltage fluctuation cycle takes less than 5 seconds, go to [EC-806. "Diagnosis Procedure"](#).

- 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0



INFOID:000000005532656

Diagnosis Procedure

1. CHECK EXHAUST SYSTEM

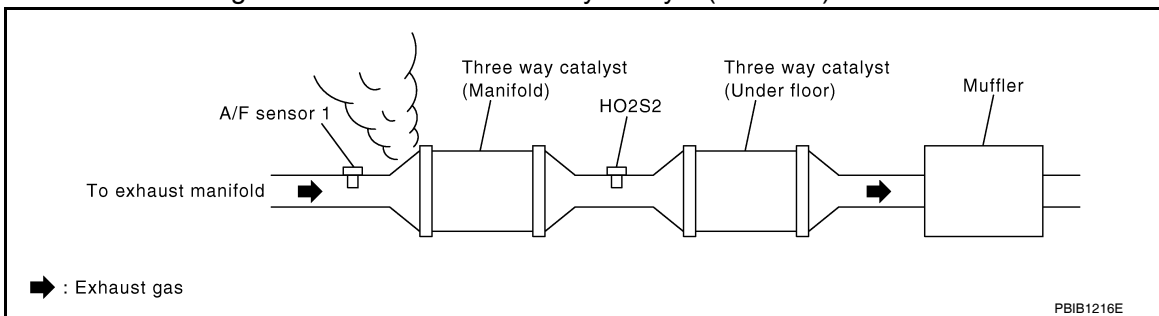
Visually check exhaust tubes and muffler for dent.

OK or NG

- OK >> GO TO 2.
- NG >> Repair or replace.

2. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).



OK or NG

- OK >> GO TO 3.
- NG >> Repair or replace.

3. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

- OK >> GO TO 4.
- NG >> Repair or replace.

4. CHECK IGNITION TIMING

Check the following items. Refer to [EC-574. "Basic Inspection"](#).

DTC P0420 THREE WAY CATALYST FUNCTION

< SERVICE INFORMATION >

[MR18DE]

Items	Specifications
Target idle speed	A/T: 700 ± 50 rpm (in P or N position)
	CVT: 700 ± 50 rpm (in P or N position)
	M/T: 700 ± 50 rpm (in Neutral position)
Ignition timing	A/T: 13 ± 5° BTDC (in P or N position)
	CVT: 13 ± 5° BTDC (in P or N position)
	M/T: 13 ± 5° BTDC (in Neutral position)

OK or NG

OK >> GO TO 5.

NG >> Follow the [EC-574, "Basic Inspection"](#).

5. CHECK FUEL INJECTOR

1. Stop engine and turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check voltage between ECM terminals 25, 29, 30, 31 and ground with CONSULT-III or tester. Refer to Wiring Diagram for fuel injectors, [EC-1010, "Wiring Diagram"](#).

Voltage: Battery voltage

OK or NG

OK >> GO TO 6.

NG >> Perform [EC-1011, "Diagnosis Procedure"](#).

6. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

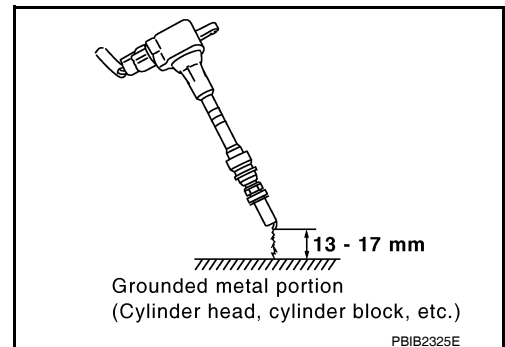
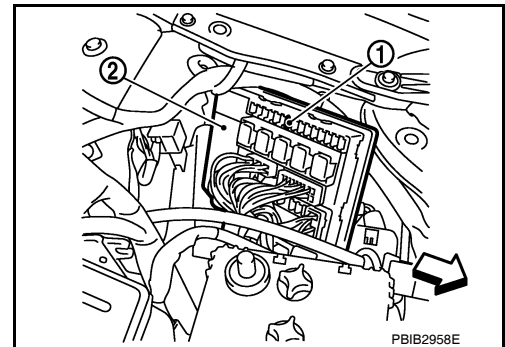
1. Turn ignition switch OFF.
2. Remove fuel pump (1) fuse in IPDM E/R (2) to release fuel pressure.

NOTE:

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- ⇐: Vehicle front

3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- Do not approach to the spark plug and the ignition coil within 50 cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.

DTC P0420 THREE WAY CATALYST FUNCTION

[MR18DE]

< SERVICE INFORMATION >

- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.

NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

OK or NG

OK >> GO TO 10.

NG >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

OK or NG

OK >> GO TO 8.

NG >> Check ignition coil, power transistor and their circuits. Refer to [EC-1019](#).

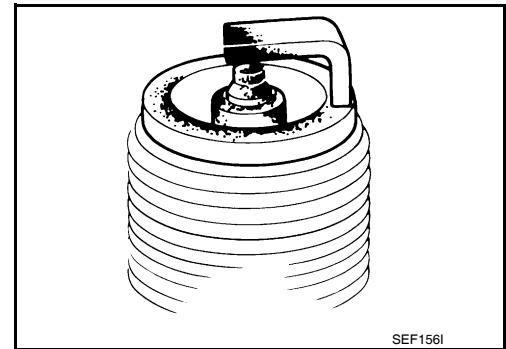
8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

OK or NG

OK >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-223, "Standard and Limit"](#).

NG >> 1. Repair or clean spark plug.
2. GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

OK or NG

OK >> **INSPECTION END**

NG >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-223, "Standard and Limit"](#).

10. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Remove fuel injector assembly.
Refer to [EM-152, "Removal and Installation"](#).
Keep fuel hose and all fuel injectors connected to fuel tube.
3. Disconnect all ignition coil harness connectors.
4. Reconnect all fuel injector harness connectors disconnected.
5. Turn ignition switch ON.
Make sure fuel does not drip from fuel injector.

OK or NG

OK (Does not drip.)>>GO TO 11.

NG (Drips.)>>Replace the fuel injector(s) from which fuel is dripping.

11. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

DTC P0420 THREE WAY CATALYST FUNCTION

< SERVICE INFORMATION >

[MR18DE]

Trouble is fixed.>>**INSPECTION END**

Trouble is not fixed.>>Replace three way catalyst (manifold).

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

DTC P0441 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

[MR18DE]

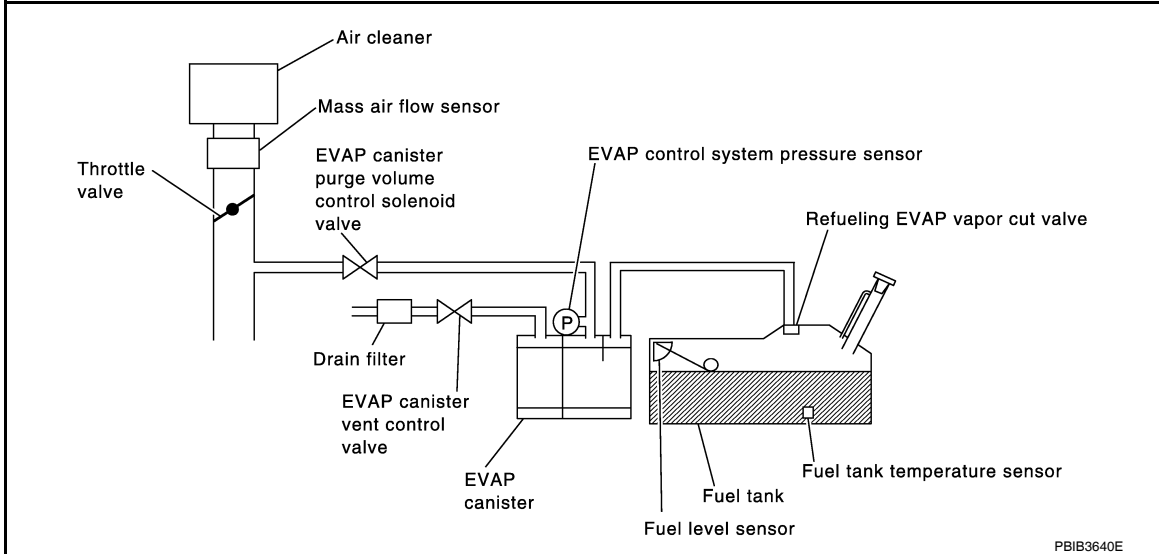
DTC P0441 EVAP CONTROL SYSTEM

System Description

INFOID:000000005532657

NOTE:

If DTC P0441 is displayed with other DTC such as P2122, P2123, P2127, P2128, P2138, first perform trouble diagnosis for other DTC.



In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

INFOID:000000005532658

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0441 0441	EVAP control system incorrect purge flow	<ul style="list-style-type: none"> EVAP control system does not operate properly. EVAP control system has a leak between intake manifold and EVAP control system pressure sensor. 	<ul style="list-style-type: none"> EVAP canister purge volume control solenoid valve stuck closed EVAP control system pressure sensor and the circuit Loose, disconnected or improper connection of rubber tube Blocked rubber tube Cracked EVAP canister EVAP canister purge volume control solenoid valve circuit Accelerator pedal position sensor Blocked purge port EVAP canister vent control valve Drain filter

DTC Confirmation Procedure

INFOID:000000005532659

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

WITH CONSULT-III

DTC P0441 EVAP CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 70 seconds.
4. Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC CONFIRMATION" mode with CONSULT-III.
5. Touch "START".
If "COMPLETED" is displayed, go to step 7.
6. When the following conditions are met, "TESTING" will be displayed on the CONSULT-III screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Shift lever	Suitable position
VHCL SPEED SE	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,800 rpm
B/FUEL SCHDL	1.0 - 10.0 msec
COOLAN TEMP/S	More than 0°C

If TESTING is not changed for a long time, retry from step 2.

7. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to [EC-811, "Diagnosis Procedure"](#).

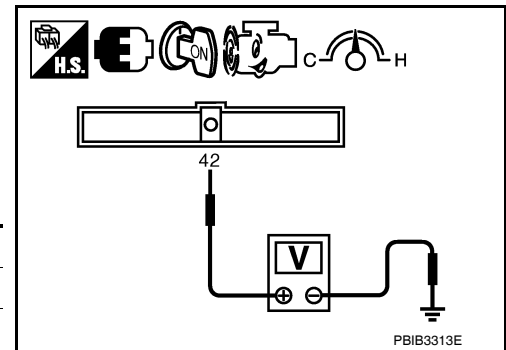
Overall Function Check

INFOID:000000005532660

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and wait at least 70 seconds.
5. Set voltmeter probes to ECM terminals 42 (EVAP control system pressure sensor signal) and ground.
6. Check EVAP control system pressure sensor value at idle speed and note it.
7. Establish and maintain the following conditions for at least 1 minute.



Air conditioner switch	ON
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Shift lever	Any position other than P, N or R

8. Verify that EVAP control system pressure sensor value stays 0.1 V less than the value at idle speed (measured at step 6) for at least 1 second.
9. If NG, go to [EC-811, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005532661

1. CHECK EVAP CANISTER

1. Turn ignition switch OFF.
2. Check EVAP canister for cracks.

OK or NG

- OK (With CONSULT-III)>>GO TO 2.
- OK (Without CONSULT-III)>>GO TO 3.
- NG >> Replace EVAP canister.

2. CHECK PURGE FLOW

DTC P0441 EVAP CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

Ⓟ With CONSULT-III

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to [EC-525, "Description"](#).
2. Start engine and let it idle.
3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III.
4. Rev engine up to 2,000 rpm.
5. Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG VOL CONT/V" opening and check vacuum existence.

PURG VOL CONT/V	VACUUM
100%	Should exist.
0%	should not exist.

OK or NG

- OK >> GO TO 7.
NG >> GO TO 4.

3. CHECK PURGE FLOW

ⓧ Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to [EC-525, "Description"](#).
4. Start engine and let it idle.
Do not depress accelerator pedal even slightly.
5. Check vacuum gauge indication before 60 seconds passed after starting engine.

Vacuum should not exist.

6. Revving engine up to 2,000 rpm after 100 seconds passed after starting engine.

Vacuum should exist.

OK or NG

- OK >> GO TO 7.
NG >> GO TO 4.

4. CHECK EVAP PURGE LINE

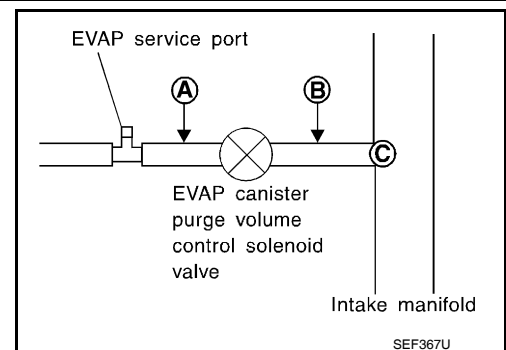
1. Turn ignition switch OFF.
2. Check EVAP purge line for improper connection or disconnection.
Refer to [EC-525, "Description"](#).

OK or NG

- OK >> GO TO 5.
NG >> Repair it.

5. CHECK EVAP PURGE HOSE AND PURGE PORT

1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.
2. Blow air into each hose and EVAP purge port **C**.



DTC P0441 EVAP CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

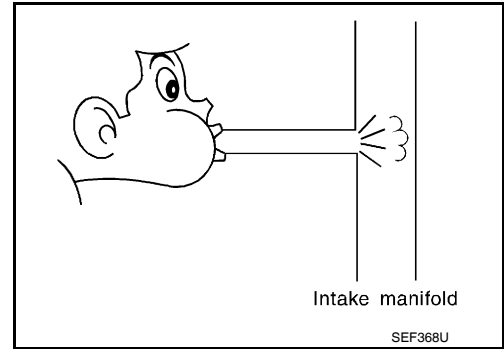
3. Check that air flows freely.

OK or NG

OK (With CONSULT-III)>>GO TO 6.

OK (Without CONSULT-III)>>GO TO 7.

NG >> Repair or clean hoses and/or purge port.



6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

1. Start engine.

2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

OK or NG

OK >> GO TO 8.

NG >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-834. "Component Inspection"](#).

OK or NG

OK >> GO TO 8.

NG >> Replace EVAP canister purge volume control solenoid valve.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.

2. Check connectors for water.

Water should not exist

OK or NG

OK >> GO TO 9.

NG >> Replace EVAP control system pressure sensor.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to [EC-851](#) or DTC P0452 and [EC-859](#) for DTC P0453.

OK or NG

OK >> GO TO 10.

NG >> Replace EVAP control system pressure sensor.

10. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.

2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 11.

NG >> Clean the rubber tube using an air blower.

11. CHECK DRAIN FILTER

Refer to [EC-814. "Component Inspection"](#).

OK or NG

OK >> GO TO 12.

NG >> Replace Drain filter.

12. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-840. "Component Inspection"](#).

DTC P0441 EVAP CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

OK or NG

- OK >> GO TO 13.
- NG >> Replace EVAP canister vent control valve.

13. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to [EC-525, "Description"](#).

OK or NG

- OK >> GO TO 14.
- NG >> Replace it.

14. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 15.

15. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

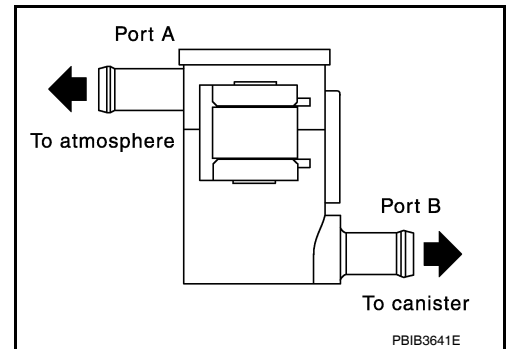
>> **INSPECTION END**

Component Inspection

INFOID:000000005532662

DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.
7. If NG, replace drain filter.



DTC P0442 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

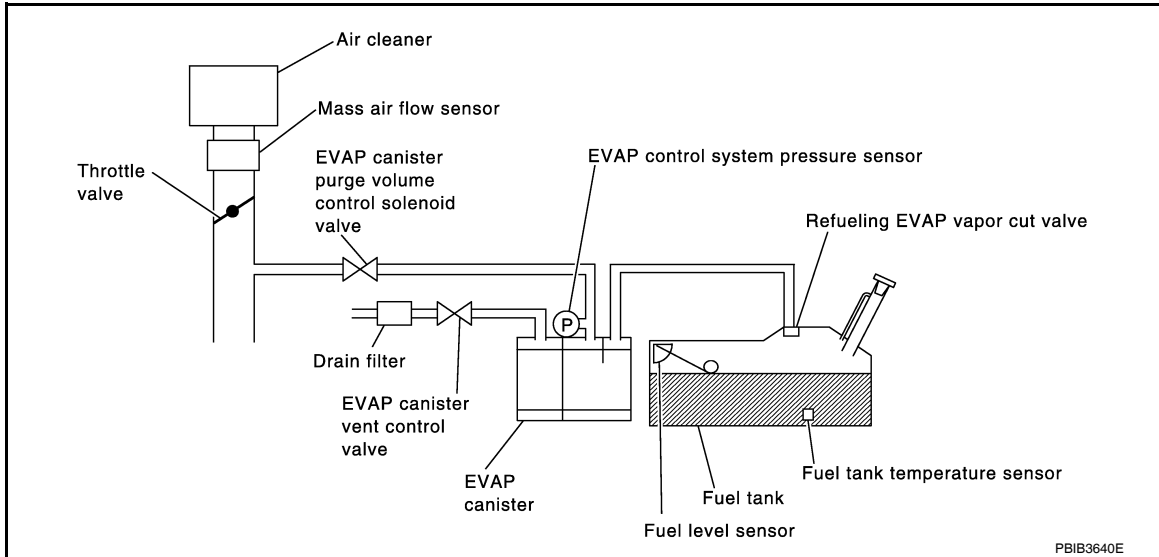
[MR18DE]

DTC P0442 EVAP CONTROL SYSTEM

On Board Diagnosis Logic

INFOID:000000005532663

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum. If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following Vacuum test conditions. The EVAP canister vent control valve is closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve will then be opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0442 0442	EVAP control system small leak detected (negative pressure)	EVAP control system has a leak, EVAP control system does not operate properly.	<ul style="list-style-type: none"> • Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Fuel tank temperature sensor • O-ring of EVAP canister vent control valve is missing or damaged • Drain filter • EVAP canister is saturated with water • EVAP control system pressure sensor • Fuel level sensor and the circuit • Refueling EVAP vapor cut valve • ORVR system leaks

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC P0442 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

[MR18DE]

DTC Confirmation Procedure

INFOID:000000005532664

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Always perform test at a temperature of 0 to 30°C (32 to 86°F).
- Open engine hood before conducting following procedure.

Ⓜ WITH CONSULT-III

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
4. Check the following conditions are met.
COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
INT/A TEMP SE: 0 - 30°C (32 - 86°F)
5. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
Follow the instruction displayed.
NOTE:
If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to [EC-574, "Basic Inspection"](#).
6. Make sure that "OK" is displayed.
If "NG" is displayed, refer to [EC-816, "Diagnosis Procedure"](#).
NOTE:
Make sure that EVAP hoses are connected to the EVAP canister purge volume control solenoid valve properly.

Ⓜ WITH GST

NOTE:

Be sure to read the explanation of Driving Pattern on [EC-542, "Emission-related Diagnostic Information"](#) before driving vehicle.

1. Start engine.
2. Drive vehicle according to Driving Pattern, [EC-542, "Emission-related Diagnostic Information"](#).
3. Stop vehicle.
4. Turn ignition switch OFF and wait at least 10 seconds and then turn ignition switch ON.
5. Select Service \$07 with GST.
 - If P0442 is displayed on the screen, go to [EC-816, "Diagnosis Procedure"](#).
 - If P0441 is displayed on the screen, go to [EC-811, "Diagnosis Procedure"](#) for DTC P0441.

Diagnosis Procedure

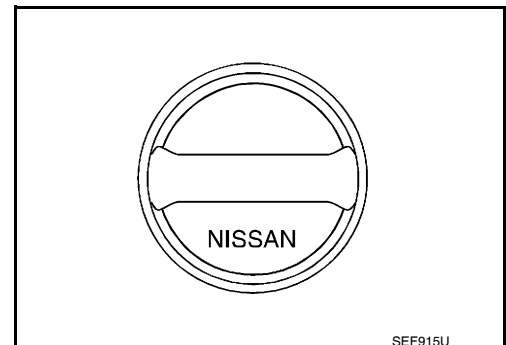
INFOID:000000005532665

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.

OK or NG

- OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

DTC P0442 EVAP CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

OK or NG

- OK >> GO TO 3.
- NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
- 2. Retighten until rereaching sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to [EC-527, "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.
- NG >> Replace fuel filler cap with a genuine one.

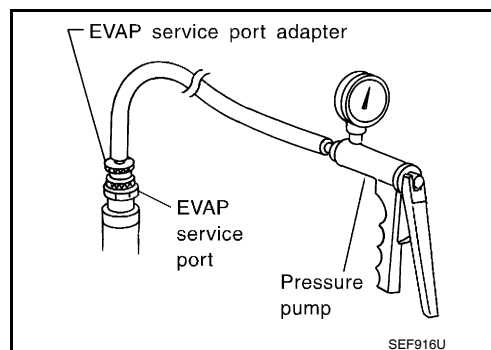
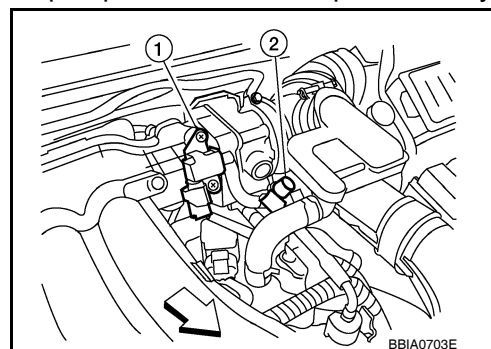
5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely. For the location of EVAP service port (2), refer to [EC-525, "Description"](#).

- EVAP canister purge volume control solenoid valve (1)
- ⇐: Vehicle front

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.



- With CONSULT-III>>GO TO 6.
- Without CONSULT-III>>GO TO 7.

6. CHECK FOR EVAP LEAK

With CONSULT-III

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-III.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

CAUTION:

- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.**

DTC P0442 EVAP CONTROL SYSTEM

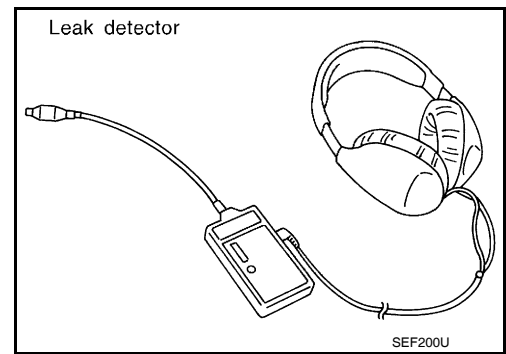
[MR18DE]

< SERVICE INFORMATION >

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-525, "Description"](#).

OK or NG

- OK >> GO TO 8.
NG >> Repair or replace.



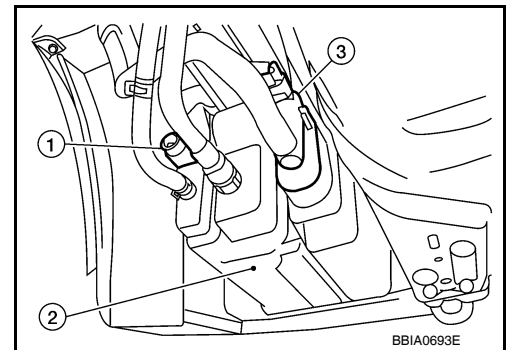
7. CHECK FOR EVAP LEAK

⊗ Without CONSULT-III

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
 - EVAP control system pressure sensor (1)
 - EVAP canister (2)
 - EVAP canister vent control valve (3)
3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

CAUTION:

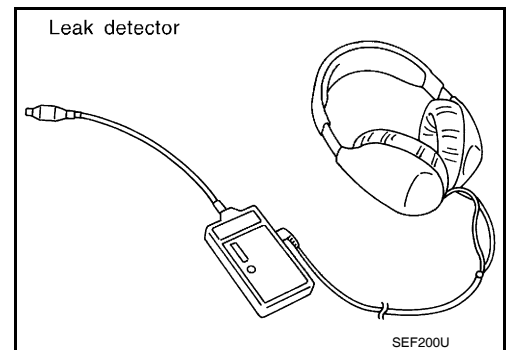
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-525, "Description"](#).

OK or NG

- OK >> GO TO 8.
NG >> Repair or replace.



8. CHECK DRAIN FILTER

Refer to [EC-821, "Component Inspection"](#).

OK or NG

- OK >> GO TO 9.
NG >> Replace drain filter.

9. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following,

- EVAP canister vent control valve is installed properly. Refer to [EC-529, "Removal and Installation"](#).
- EVAP canister vent control valve. Refer to [EC-840, "Component Inspection"](#).

OK or NG

- OK >> GO TO 10.
NG >> Repair or replace EVAP canister vent control valve and O-ring.

10. CHECK IF EVAP CANISTER SATURATED WITH WATER

DTC P0442 EVAP CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

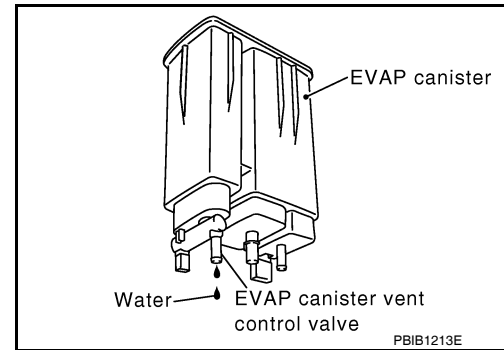
1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 11.

No (With CONSULT-III)>>GO TO 13.

No (Without CONSULT-III)>>GO TO 14.



11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK (With CONSULT-III)>>GO TO 13.

OK (Without CONSULT-III)>>GO TO 14.

NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose connected to EVAP canister for clogging or poor connection

>> Repair hose or replace EVAP canister.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-III screen to increase "PURG VOL CONT/V" opening to 100%.
5. Check vacuum hose for vacuum.

Vacuum should exist.

OK or NG

OK >> GO TO 16.

NG >> GO TO 15.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK >> GO TO 16.

NG >> GO TO 15.

15. CHECK VACUUM HOSE

DTC P0442 EVAP CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

Check vacuum hoses for clogging or disconnection. Refer to [EC-602, "Vacuum Hose Drawing"](#).

OK or NG

- OK >> GO TO 16.
- NG >> Repair or reconnect the hose.

16. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-834, "Component Inspection"](#).

OK or NG

- OK >> GO TO 17.
- NG >> Replace EVAP canister purge volume control solenoid valve.

17. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to [EC-773, "Component Inspection"](#).

OK or NG

- OK >> GO TO 18.
- NG >> Replace fuel level sensor unit.

18. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-850, "Component Inspection"](#).

OK or NG

- OK >> GO TO 19.
- NG >> Replace EVAP control system pressure sensor.

19. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to [EC-525](#).

OK or NG

- OK >> GO TO 20.
- NG >> Repair or reconnect the hose.

20. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 21.

21. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to [EC-532](#).

OK or NG

- OK >> GO TO 22.
- NG >> Repair or replace hoses and tubes.

22. CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

- OK >> GO TO 23.
- NG >> Repair or replace hoses, tubes or filler neck tube.

23. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to [EC-535, "Component Inspection"](#).

OK or NG

- OK >> GO TO 24.
- NG >> Replace refueling EVAP vapor cut valve with fuel tank.

24. CHECK FUEL LEVEL SENSOR

Refer to [DI-20](#).

DTC P0442 EVAP CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

OK or NG

OK >> GO TO 25.

NG >> Replace fuel level sensor unit.

25. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

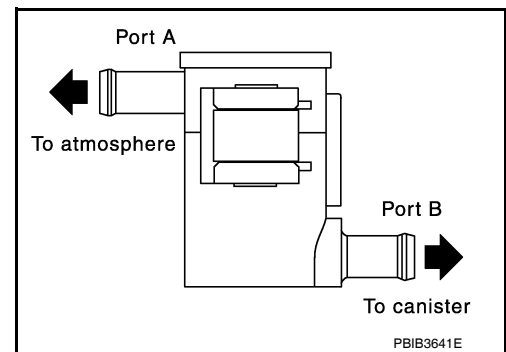
>> INSPECTION END

Component Inspection

INFOID:000000005532666

DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.
7. If NG, replace drain filter.



DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[MR18DE]

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:000000005532667

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*1		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
ABS actuator and electric unit (control unit)	Vehicle speed*2		
Combination meter			

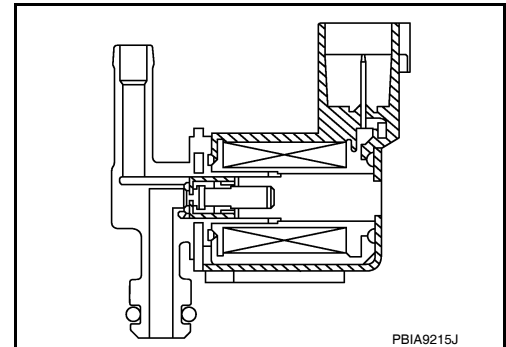
*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM though CAN communication line.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532668

Specification data are reference values.

Monitor item	Condition	Specification
PURG VOL C/V	<ul style="list-style-type: none"> Engine: After warming up Shift lever: P or N (A/T, CVT), Neutral (M/T) Air conditioner switch: OFF No load 	Idle (Accelerator pedal is not depressed even slightly, after engine starting) 0%
	2,000 rpm	0 - 50%

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[MR18DE]

On Board Diagnosis Logic

INFOID:000000005532669

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0443 0443	EVAP canister purge volume control solenoid valve	A)	The canister purge flow is detected during the vehicle is stopped while the engine is running, even when EVAP canister purge volume control solenoid valve is completely closed.	<ul style="list-style-type: none"> • EVAP control system pressure sensor • EVAP canister purge volume control solenoid valve (EVAP canister purge volume control solenoid valve is stuck open.) • EVAP canister vent control valve • Drain filter • EVAP canister • Hoses (Hoses are connected incorrectly or clogged.)
		B)	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	

DTC Confirmation Procedure

INFOID:000000005532670

Perform PROCEDURE FOR MALFUNCTION A first.

If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

TESTING CONDITION:

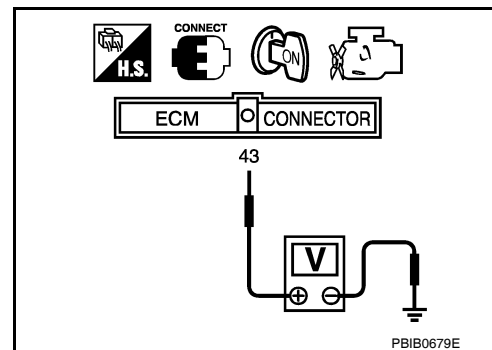
- Perform "DTC Confirmation Procedure" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Always perform test at a temperature of 5 to 60°C (41 to 140°F).
- Cool the vehicle so that engine coolant temperature becomes same level as ambient temperature.

④ With CONSULT-III

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
2. Check that the following condition are met.
FUEL T/TMP SE: 0 – 35°C (32 – 95°F)
3. Start engine and wait at least 60 seconds.
4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to [EC-826, "Diagnosis Procedure"](#).

④ With GST

1. Turn ignition switch ON.
2. Set voltmeter probes to ECM terminal 43 (FTT sensor signal) and ground.
3. Check that the voltage is 3.1 – 4.2 V.
4. Start engine and wait at least 60 seconds.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-826, "Diagnosis Procedure"](#).



PROCEDURE FOR MALFUNCTION B

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

④ With CONSULT-III

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[MR18DE]

< SERVICE INFORMATION >

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
5. Touch "START".
6. Start engine and let it idle until "TESTING" on CONSULT-III changes to "COMPLETED". (It will take approximately 10 seconds.)
If "TESTING" is not displayed after 5 minutes, retry from step 2.
7. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to [EC-826, "Diagnosis Procedure"](#).

With GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 20 seconds.
4. Select Service \$07 with GST.
5. If 1st trip DTC is detected, go to [EC-826, "Diagnosis Procedure"](#).

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

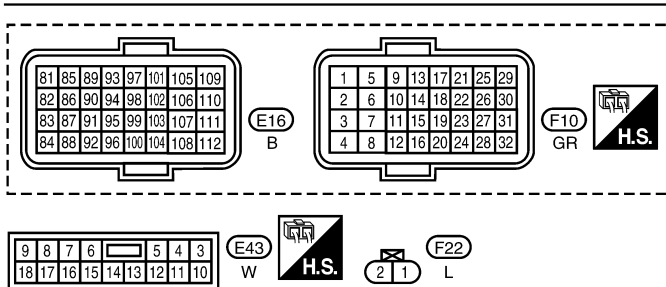
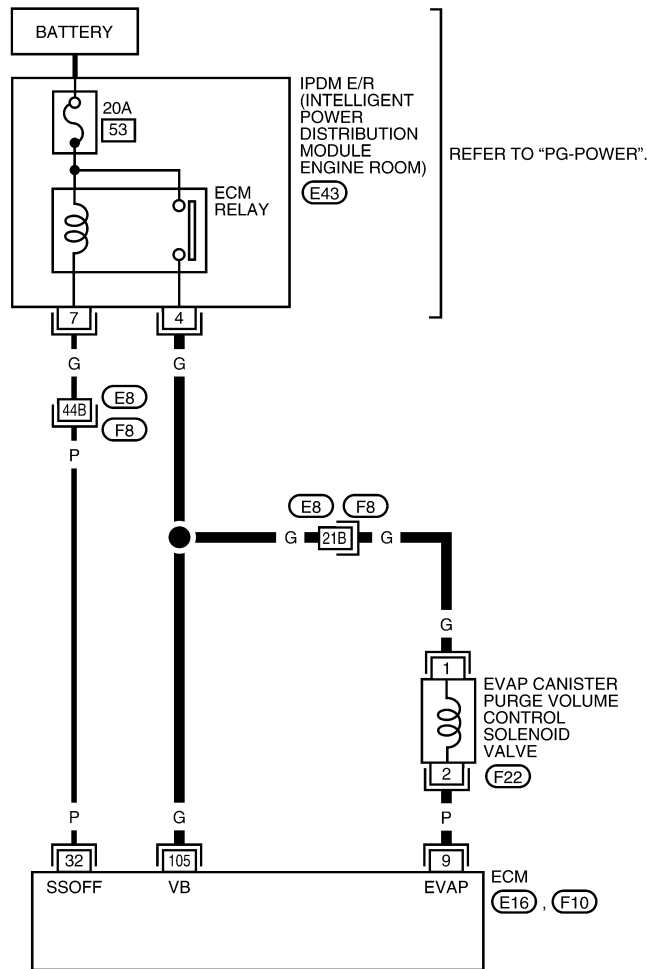
[MR18DE]

Wiring Diagram

INFOID:000000005532671

EC-PGC/V-01

: DETECTABLE LINE FOR DTC
 : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
 (F8) - SUPER MULTIPLE JUNCTION (SMJ)

ABBWA0361GB

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

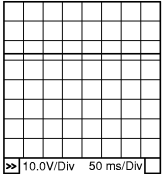
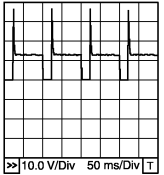
CAUTION:

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[MR18DE]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	P	EVAP canister purge volume control solenoid valve	[Engine is running] <ul style="list-style-type: none"> • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting. 	BATTERY VOLTAGE (11 - 14 V)★  <small>10.0V/Div 50 ms/Div</small> PBIB0050E
			[Engine is running] <ul style="list-style-type: none"> • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine) 	Approximately 10 V★  <small>10.0 V/Div 50 ms/Div</small> PBIB0520E
32	P	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] <ul style="list-style-type: none"> • For a few seconds after turning ignition switch OFF 	0 - 1.0 V
			[Ignition switch: OFF] <ul style="list-style-type: none"> • More than a few seconds after turning ignition switch OFF 	BATTERY VOLTAGE (11 - 14 V)
105	G	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

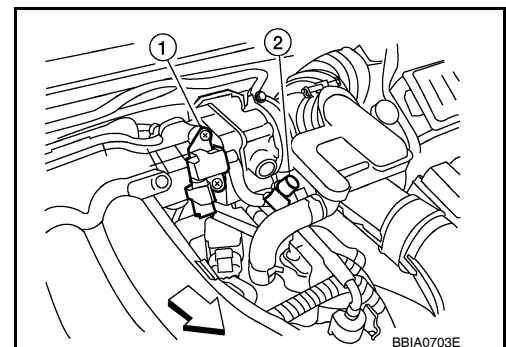
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005532672

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve (1) harness connector.
 - EVAP service port (2)
 - ↙: Vehicle front
3. Turn ignition switch ON.



DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[MR18DE]

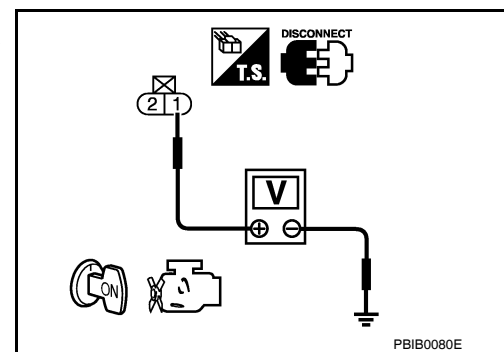
< SERVICE INFORMATION >

4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 3.
- NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 9 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 4.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

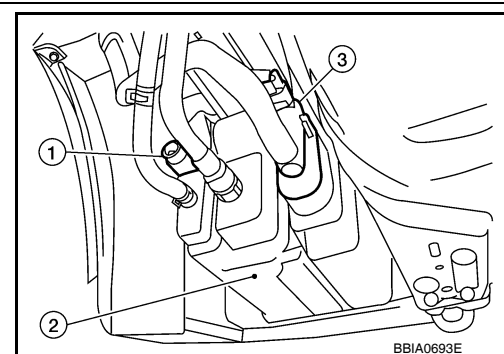
4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
 - EVAP control system pressure sensor (1)
 - EVAP canister (2)
 - EVAP canister vent control valve (3)
2. Check connectors for water.

Water should not exist.

OK or NG

- OK >> GO TO 5.
- NG >> Replace EVAP control system pressure sensor.



5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-850, "Component Inspection"](#).

OK or NG

- OK (With CONSULT-III) >> GO TO 6.
- OK (Without CONSULT-III) >> GO TO 7.
- NG >> Replace EVAP control system pressure sensor.

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Start engine.

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[MR18DE]

< SERVICE INFORMATION >

4. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

OK or NG

- OK >> GO TO 8.
- NG >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-829, "Component Inspection"](#).

OK or NG

- OK >> GO TO 8.
- NG >> Replace EVAP canister purge volume control solenoid valve.

8. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

- OK >> GO TO 9.
- NG >> Clean the rubber tube using an air blower.

9. CHECK DRAIN FILTER

Refer to [EC-814, "Component Inspection"](#).

OK or NG

- OK >> GO TO 10.
- NG >> Replace drain filter.

10. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-840, "Component Inspection"](#).

OK or NG

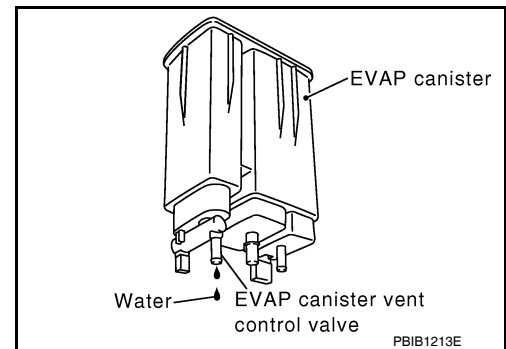
- OK >> GO TO 11.
- NG >> Replace EVAP canister vent control valve.

11. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?

YES or NO

- YES >> GO TO 12.
- NO >> GO TO 14.



12. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

- OK >> GO TO 14.
- NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[MR18DE]

- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

14.CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

Component Inspection

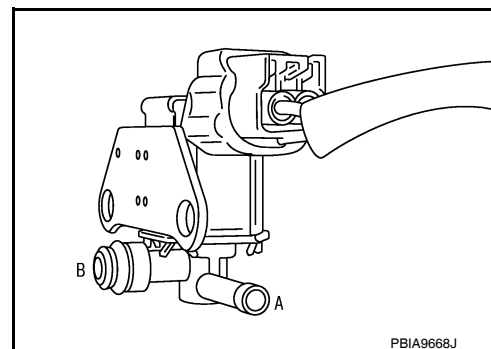
INFOID:000000005532673

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Ⓟ With CONSULT-III

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

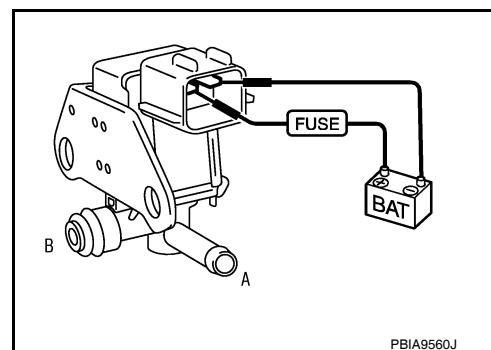
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100%	Yes
0%	No



ⓧ Without CONSULT-III

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between A and B
12 V direct current supply between terminals 1 and 2	Yes
No supply	No



Removal and Installation

INFOID:000000005532674

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EM-137](#), "Component".

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[MR18DE]

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:000000005532675

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed* ¹	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage* ¹		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
ABS actuator and electric unit (control unit)	Vehicle speed* ²		
Combination meter			

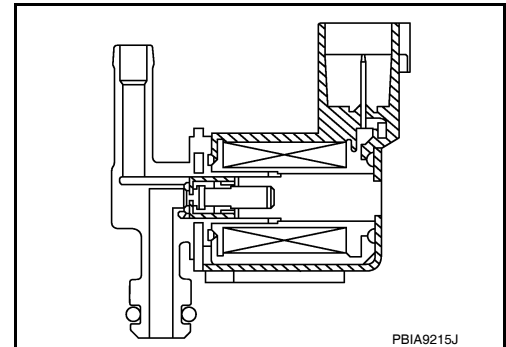
*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM though CAN communication line.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532676

Specification data are reference values.

Monitor item	Condition	Specification
PURG VOL C/V	<ul style="list-style-type: none"> • Engine: After warming up • Shift lever: P or N (A/T, CVT), Neutral (M/T) • Air conditioner switch: OFF • No load 	Idle (Accelerator pedal is not depressed even slightly, after engine starting)
	2,000 rpm	0 - 50%

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[MR18DE]

On Board Diagnosis Logic

INFOID:000000005532677

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444 0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	<ul style="list-style-type: none"> • Harness or connectors (EVAP canister purge volume control solenoid valve circuit is open or shorted.) • EVAP canister purge volume control solenoid valve
P0445 0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	<ul style="list-style-type: none"> • Harness or connectors (EVAP canister purge volume control solenoid valve circuit is shorted.) • EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

INFOID:000000005532678

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11 V at idle.

1. Start engine and let it idle for at least 13 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-833. "Diagnosis Procedure"](#).

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[MR18DE]

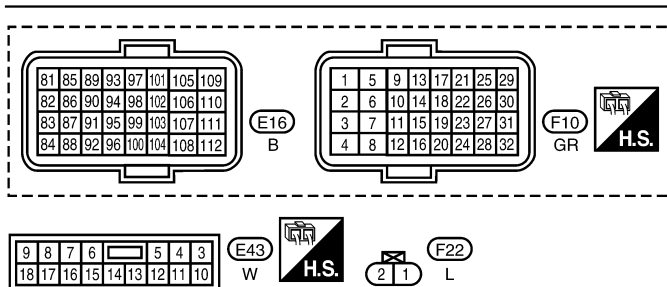
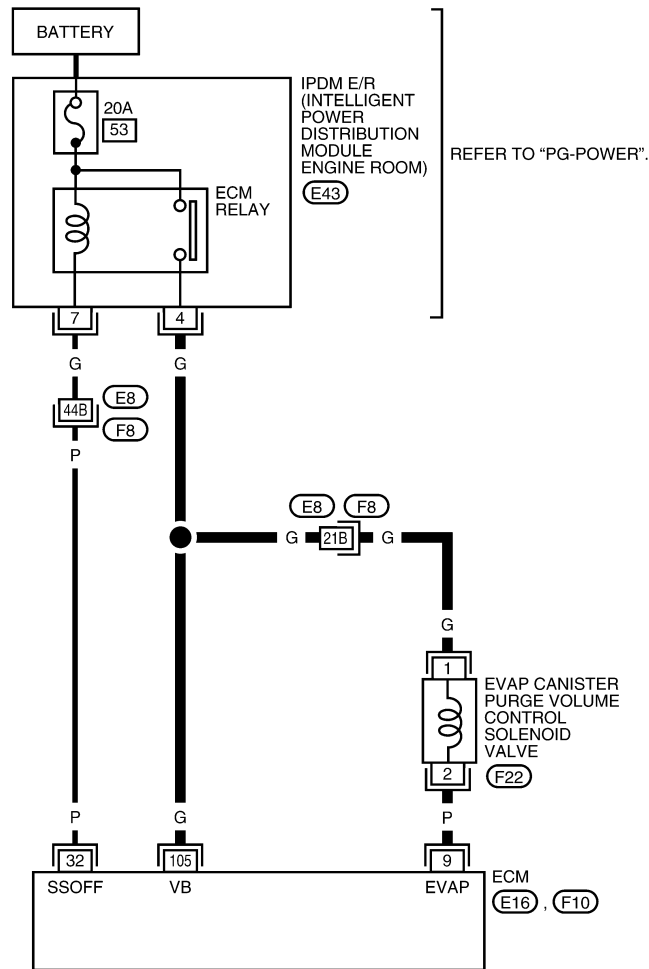
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000005532679

EC-PGC/V-01

: DETECTABLE LINE FOR DTC
 : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

(F8) - SUPER MULTIPLE JUNCTION (SMJ)

ABBWA0361GB

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

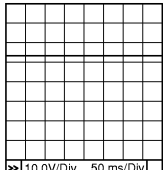
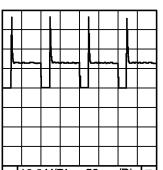
CAUTION:

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[MR18DE]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	P	EVAP canister purge volume control solenoid valve	[Engine is running] • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting.	BATTERY VOLTAGE (11 - 14 V)★  <small>10.0V/Div 50 ms/Div</small> PBIB0050E
			[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10 V★  <small>10.0 V/Div 50 ms/Div</small> PBIB0520E
32	P	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.0 V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
105	G	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

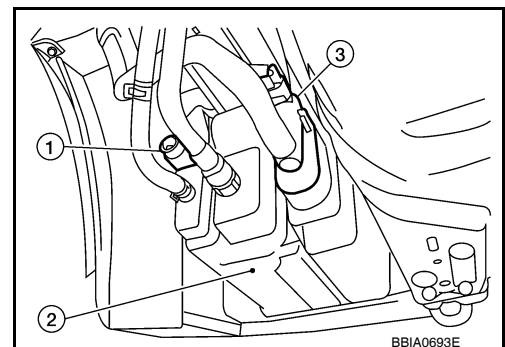
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005532680

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve (1) harness connector.
- EVAP canister port (2)
3. Turn ignition switch ON.



DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[MR18DE]

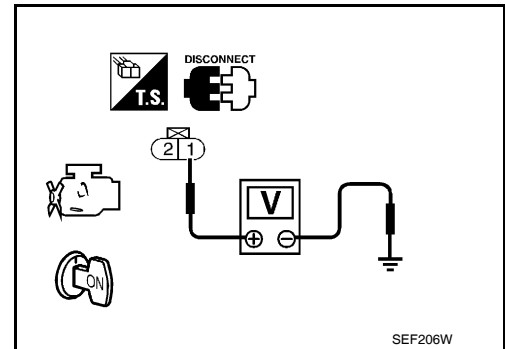
< SERVICE INFORMATION >

4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 3.
- NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 9 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK (With CONSULT-III) >> GO TO 4.
- OK (Without CONSULT-III) >> GO TO 5.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

OK or NG

- OK >> GO TO 6.
- NG >> GO TO 5.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-829, "Component Inspection"](#).

OK or NG

- OK >> GO TO 6.
- NG >> Replace EVAP canister purge volume control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005532681

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

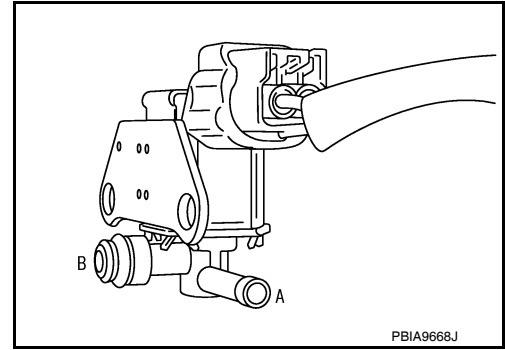
[MR18DE]

< SERVICE INFORMATION >

④ With CONSULT-III

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

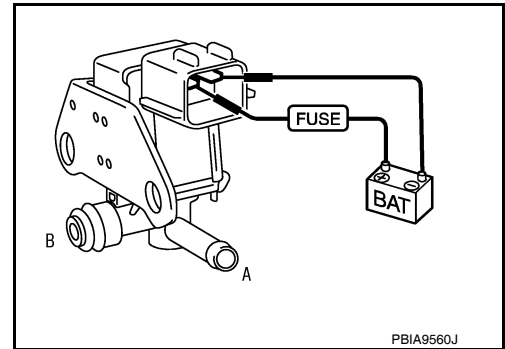
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100%	Yes
0%	No



⊗ Without CONSULT-III

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between A and B
12 V direct current supply between terminals 1 and 2	Yes
No supply	No



Removal and Installation

INFOID:000000005532682

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EM-137, "Component"](#).

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

DTC P0447 EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

[MR18DE]

DTC P0447 EVAP CANISTER VENT CONTROL VALVE

Component Description

INFOID:000000005532683

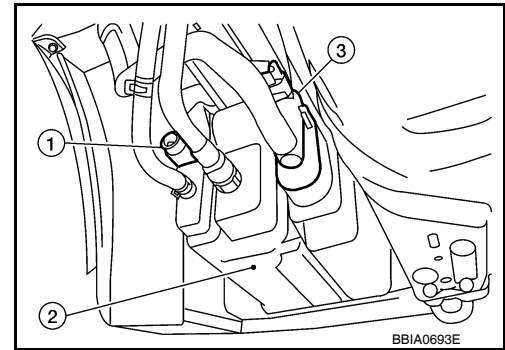
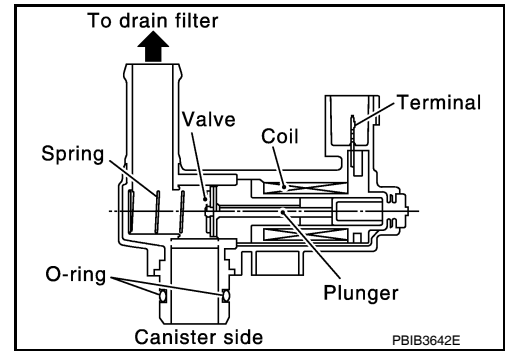
The EVAP canister vent control valve (3) is located on the EVAP canister (2) and is used to seal the canister vent.

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows EVAP control system diagnoses.

- EVAP control system pressure sensor (1)



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532684

Specification data are reference values.

Monitor item	Condition	Specification
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

INFOID:000000005532685

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0447 0447	EVAP canister vent control valve circuit open	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	<ul style="list-style-type: none"> • Harness or connectors (EVAP canister vent control valve circuit is open or shorted.) • EVAP canister vent control valve • Drain filter

DTC Confirmation Procedure

INFOID:000000005532686

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11 V at idle.

1. Start engine and wait at least 8 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-838, "Diagnosis Procedure"](#).

DTC P0447 EVAP CANISTER VENT CONTROL VALVE

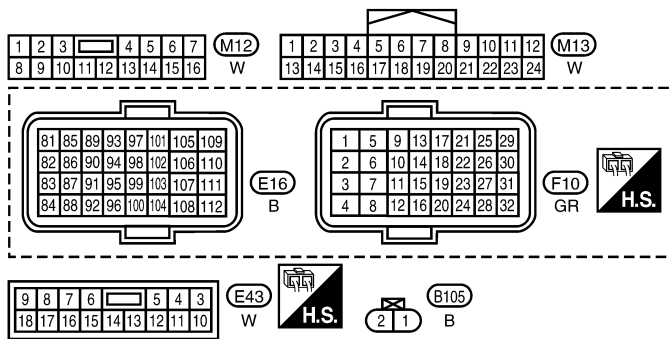
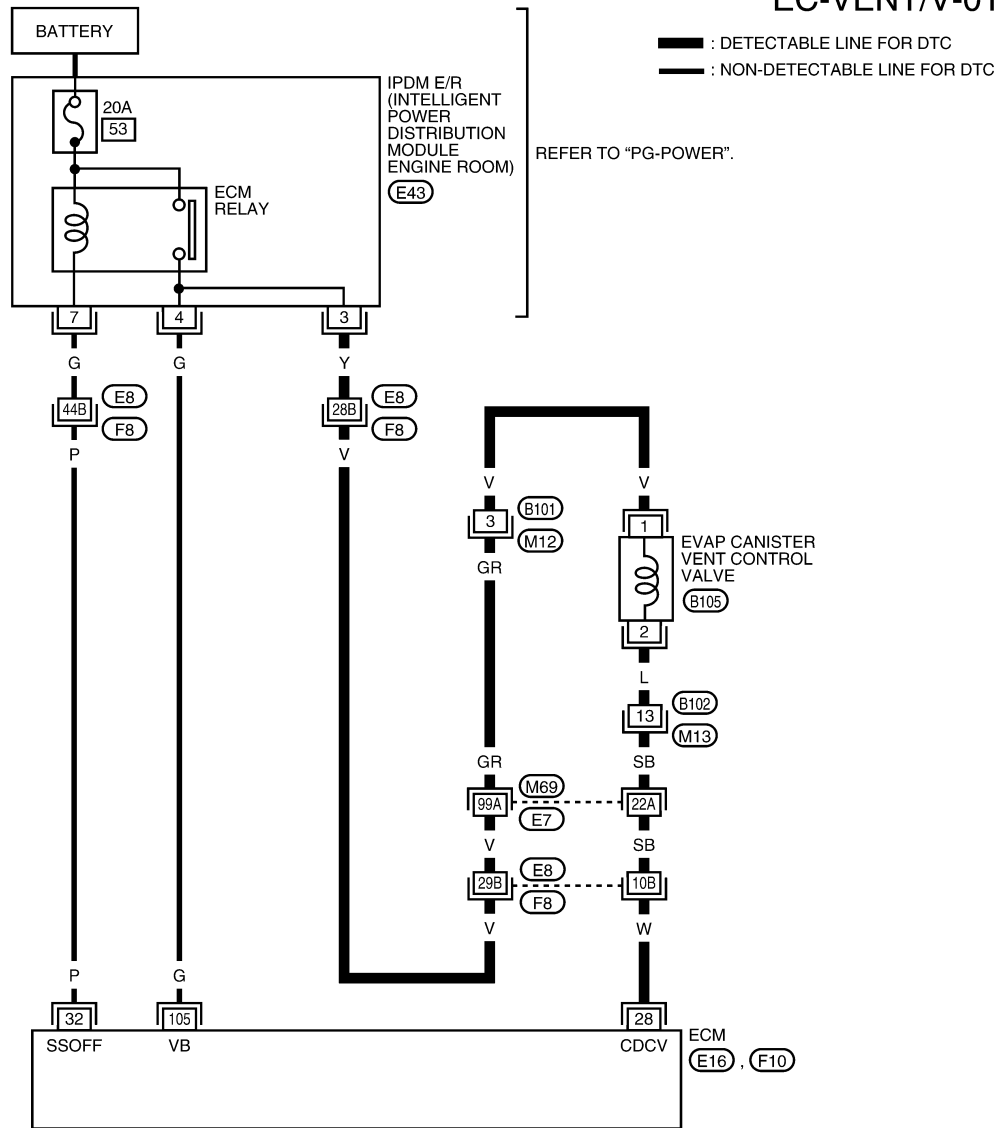
< SERVICE INFORMATION >

[MR18DE]

INFOID:000000005532687

Wiring Diagram

EC-VENT/V-01



REFER TO THE FOLLOWING.
 (M69), (F8) - SUPER MULTIPLE JUNCTION (SMJ)

AABWA0224GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0447 EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

[MR18DE]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	W	EVAP canister vent control valve	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
32	P	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.0 V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
105	G	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

Diagnosis Procedure

INFOID:000000005532688

1. INSPECTION START

1. Do you have CONSULT-III?

Yes or No

Yes >> GO TO 2.

No >> GO TO 3.

2. CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

Ⓟ **With CONSULT-III**

1. Turn ignition switch OFF and then turn ON.
2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-III.
3. Touch "ON/OFF" on CONSULT-III screen.
4. Check for operating sound of the valve.

Clicking noise should be heard.

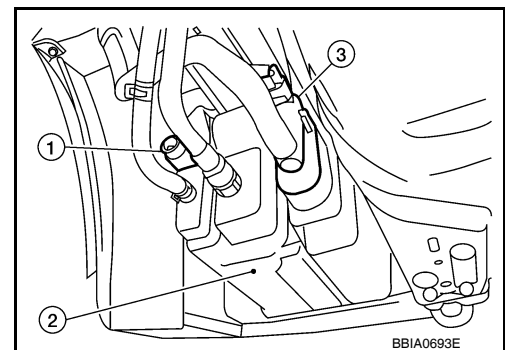
OK or NG

OK >> GO TO 8.

NG >> GO TO 3.

3. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve (3) harness connector.
 - EVAP control system pressure sensor (1)
 - EVAP canister (2)
3. Turn ignition switch ON.



DTC P0447 EVAP CANISTER VENT CONTROL VALVE

[MR18DE]

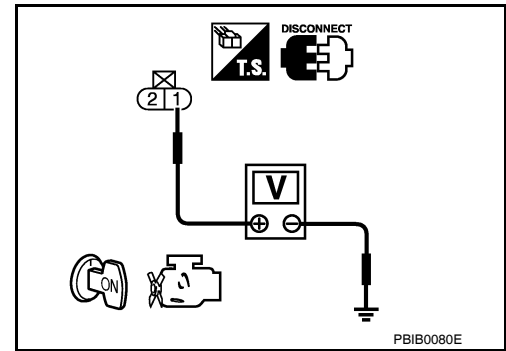
< SERVICE INFORMATION >

4. Check voltage between EVAP canister vent control valve terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness connectors E7, M69
- Harness connectors M12, B101
- Harness for open or short between EVAP canister vent control valve and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 28 and EVAP canister vent control valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 7.
- NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness connectors E7, M69
- Harness connectors M13, B102
- Harness for open or short between EVAP canister vent control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

- OK >> GO TO 8.
- NG >> Clean the rubber tube using an air blower.

8. CHECK DRAIN FILTER

Refer to [EC-814, "Component Inspection"](#).

OK or NG

- OK >> GO TO 9.
- NG >> Replace drain filter.

9. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-840, "Component Inspection"](#).

DTC P0447 EVAP CANISTER VENT CONTROL VALVE

[MR18DE]

< SERVICE INFORMATION >

OK or NG

OK >> GO TO 10.

NG >> Replace EVAP canister vent control valve.

10. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

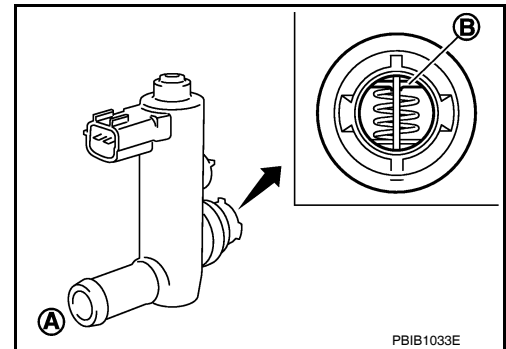
Component Inspection

INFOID:000000005532689

EVAP CANISTER VENT CONTROL VALVE

 With CONSULT-III

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
If NG, replace EVAP canister vent control valve.
If OK, go to next step.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch ON.



5. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
6. Check air passage continuity and operation delay time.
Make sure new O-ring is installed properly.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

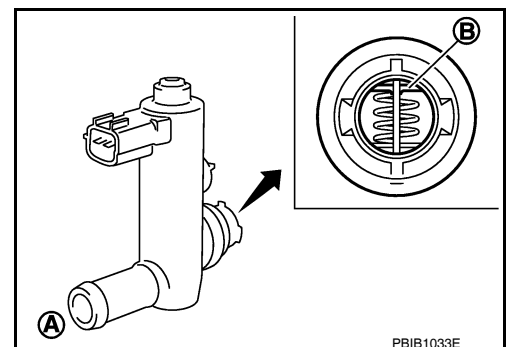
Operation takes less than 1 second.

If NG, go to next step.

7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform step 6 again.
If NG, replace EVAP canister vent control valve.

 Without CONSULT-III

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



DTC P0447 EVAP CANISTER VENT CONTROL VALVE

[MR18DE]

< SERVICE INFORMATION >

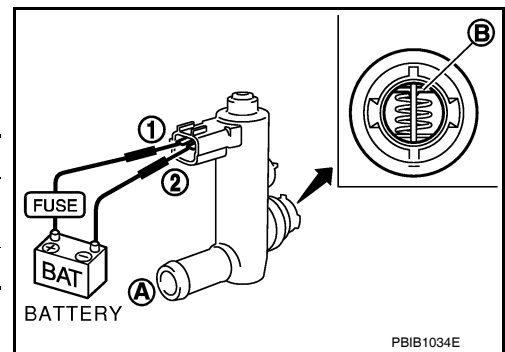
- Check air passage continuity and operation delay time under the following conditions.
Make sure new O-ring is installed properly.

Condition	Air passage continuity between A and B
12 V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

If NG, go to next step.

- Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
- Perform step 3 again.
If NG, replace EVAP canister vent control valve.



A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

DTC P0448 EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

[MR18DE]

DTC P0448 EVAP CANISTER VENT CONTROL VALVE

Component Description

INFOID:000000005532690

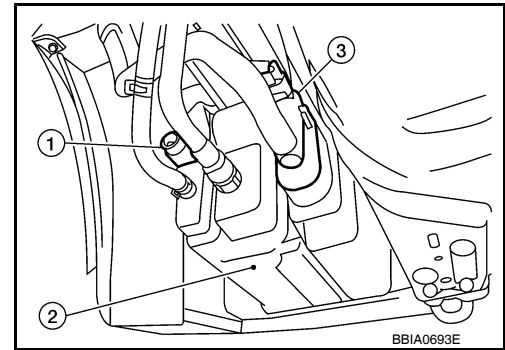
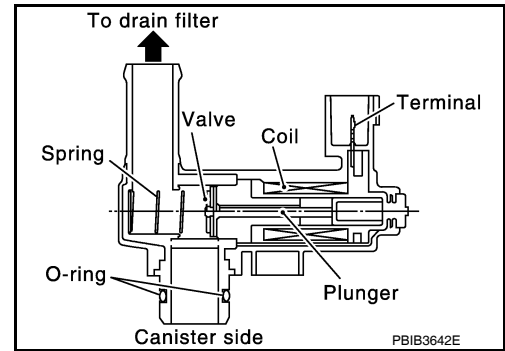
The EVAP canister vent control valve (3) is located on the EVAP canister (2) and is used to seal the canister vent.

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows EVAP control system diagnoses.

- EVAP control system pressure sensor (1)



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532691

Specification data are reference values.

Monitor item	Condition	Specification
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

INFOID:000000005532692

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0448 0448	EVAP canister vent control valve close	EVAP canister vent control valve remains closed under specified driving conditions.	<ul style="list-style-type: none"> • EVAP canister vent control valve • EVAP control system pressure sensor and the circuit • Blocked rubber tube to EVAP canister vent control valve • Drain filter • EVAP canister is saturated with water

DTC Confirmation Procedure

INFOID:000000005532693

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

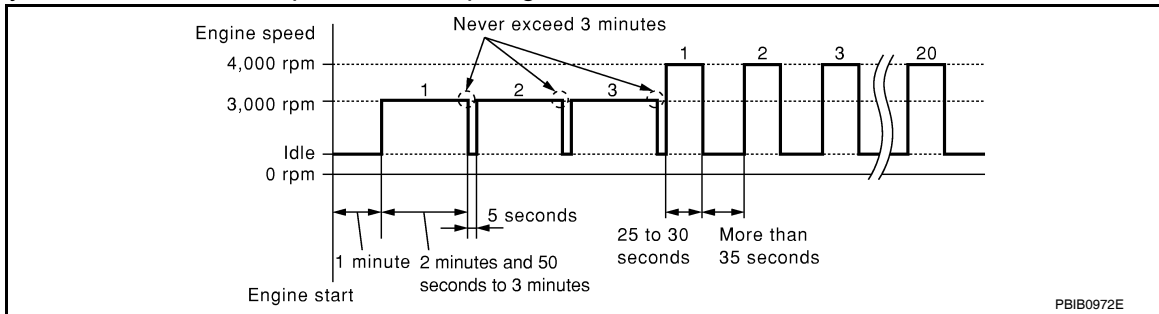
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 1 minute.
4. Repeat next procedures three times.

DTC P0448 EVAP CANISTER VENT CONTROL VALVE

[MR18DE]

< SERVICE INFORMATION >

- a. Increase the engine speed up to 3,000 to 3,500 rpm and keep it for 2 minutes and 50 seconds to 3 minutes.
Never exceed 3 minutes.
- b. Fully released accelerator pedal and keep engine idle for about 5 seconds.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-845, "Diagnosis Procedure"](#).
If 1st trip DTC is not detected, go to the next step.
7. Repeat next procedure 20 times.
 - a. Quickly increase the engine speed up to 4,000 to 4,500 rpm or more and keep it for 25 to 30 seconds.
 - b. Fully released accelerator pedal and keep engine idle for at least 35 seconds.



8. Check 1st trip DTC.
9. If 1st trip DTC is detected, go to [EC-845, "Diagnosis Procedure"](#).

DTC P0448 EVAP CANISTER VENT CONTROL VALVE

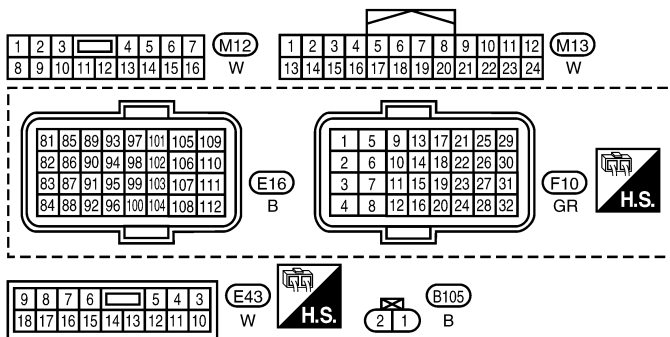
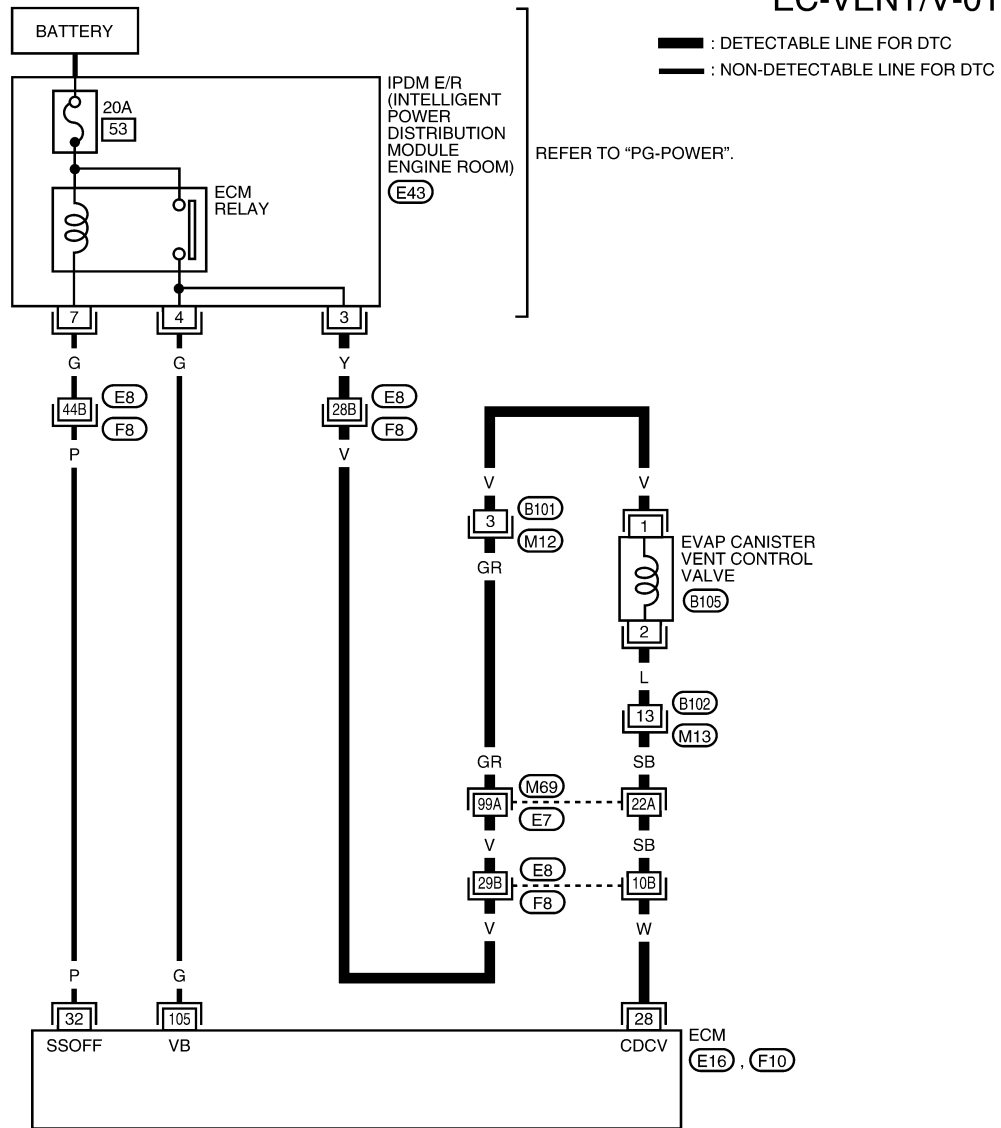
< SERVICE INFORMATION >

[MR18DE]

INFOID:000000005532694

Wiring Diagram

EC-VENT/V-01



REFER TO THE FOLLOWING.
 (M69), (F8) - SUPER
 MULTIPLE JUNCTION (SMJ)

AABWA0224GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0448 EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

[MR18DE]

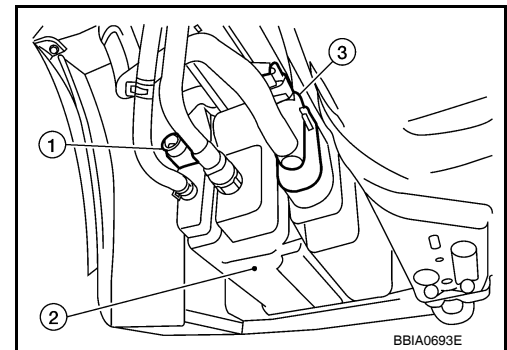
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	W	EVAP canister vent control valve	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
32	P	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.0 V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
105	G	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

Diagnosis Procedure

INFOID:000000005532695

1. CHECK RUBBER TUBE

- Turn ignition switch OFF.
- Disconnect rubber tube connected to EVAP canister vent control valve (3).
- Check the rubber tube for clogging.
 - EVAP control system pressure sensor (1)
 - EVAP canister (2)



OK or NG

- OK >> GO TO 2.
- NG >> Clean rubber tube using an air blower.

2. CHECK DRAIN FILTER

Refer to [EC-814. "Component Inspection"](#).

OK or NG

- OK >> GO TO 3.
- NG >> Replace drain filter.

3. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-840. "Component Inspection"](#).

OK or NG

- OK >> GO TO 4.
- NG >> Replace EVAP canister vent control valve.

4. CHECK IF EVAP CANISTER SATURATED WITH WATER

- Remove EVAP canister with EVAP canister vent control valve attached.

DTC P0448 EVAP CANISTER VENT CONTROL VALVE

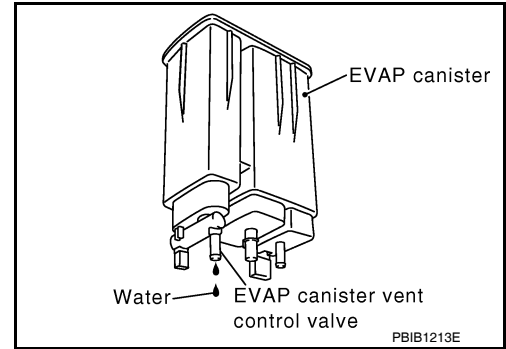
[MR18DE]

< SERVICE INFORMATION >

2. Does water drain from the EVAP canister.

Yes or No

- Yes >> GO TO 5.
- No >> GO TO 7.



5. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

- OK >> GO TO 7.
- NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

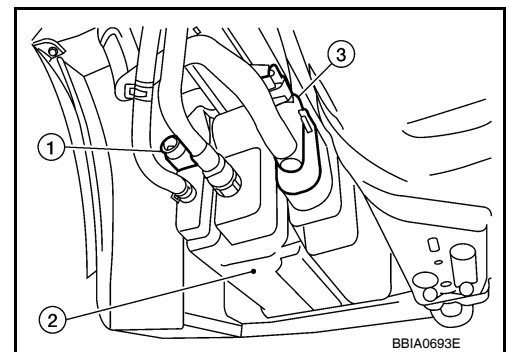
Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor (1) harness connector.
 - EVAP canister (2)
 - EVAP canister vent control valve (3)
2. Check connectors for water.



Water should not exist.

OK or NG

- OK >> GO TO 8.
- NG >> Replace EVAP control system pressure sensor.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-850, "Component Inspection"](#).

OK or NG

- OK >> GO TO 9.
- NG >> Replace EVAP control system pressure sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005532696

EVAP CANISTER VENT CONTROL VALVE

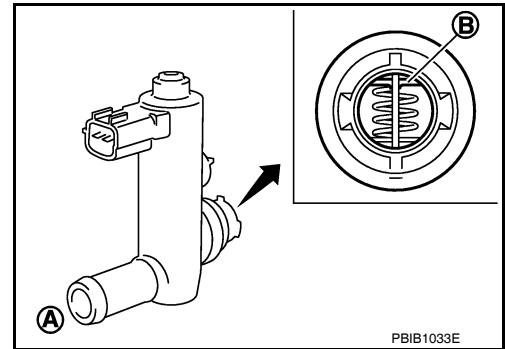
DTC P0448 EVAP CANISTER VENT CONTROL VALVE

[MR18DE]

< SERVICE INFORMATION >

Ⓟ With CONSULT-III

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
If NG, replace EVAP canister vent control valve.
If OK, go to next step.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch ON.



5. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
6. Check air passage continuity and operation delay time.
Make sure new O-ring is installed properly.

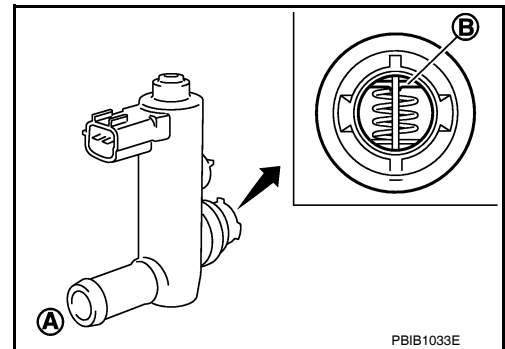
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.
If NG, go to next step.

7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform step 6 again.
If NG, replace EVAP canister vent control valve.

ⓧ Without CONSULT-III

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.

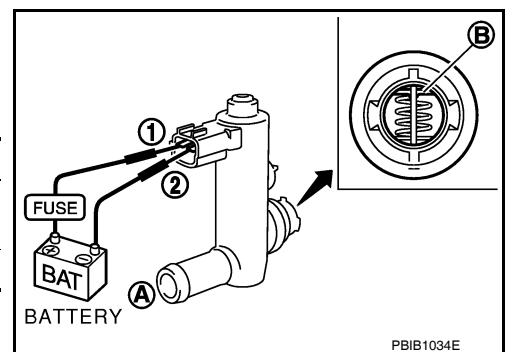


3. Check air passage continuity and operation delay time under the following conditions.
Make sure new O-ring is installed properly.

Condition	Air passage continuity between A and B
12 V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.
If NG, go to next step.

4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform step 3 again.
If NG, replace EVAP canister vent control valve.



DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

[MR18DE]

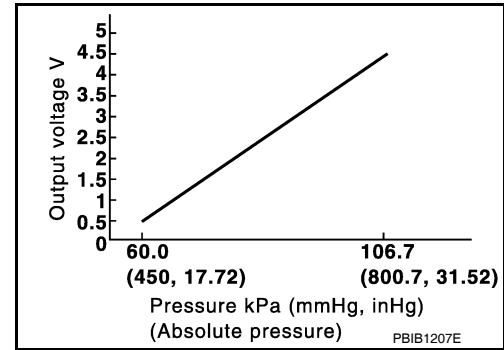
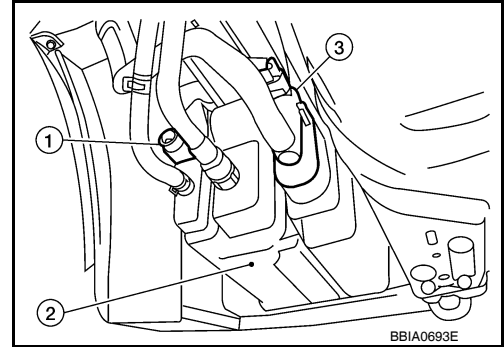
DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

Component Description

INFOID:000000005532697

The EVAP control system pressure sensor (1) detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.

- EVAP canister (2)
- EVAP canister vent control valve (3)



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532698

Specification data are reference values.

Monitor item	Condition	Specification
EVAP SYS PRES	• Ignition switch: ON	Approx. 1.8 - 4.8 V

On Board Diagnosis Logic

INFOID:000000005532699

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0451 0451	EVAP control system pressure sensor performance	ECM detects a sloshing signal from the EVAP control system pressure sensor	<ul style="list-style-type: none"> • Harness or connectors [Crankshaft position sensor (POS) circuit is shorted.] (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Crankshaft position sensor (POS) • Accelerator pedal position sensor • Refrigerant pressure sensor

DTC Confirmation Procedure

INFOID:000000005532700

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and wait at least 40 seconds.

NOTE:

DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

[MR18DE]

< SERVICE INFORMATION >

Do not depress accelerator pedal even slightly.

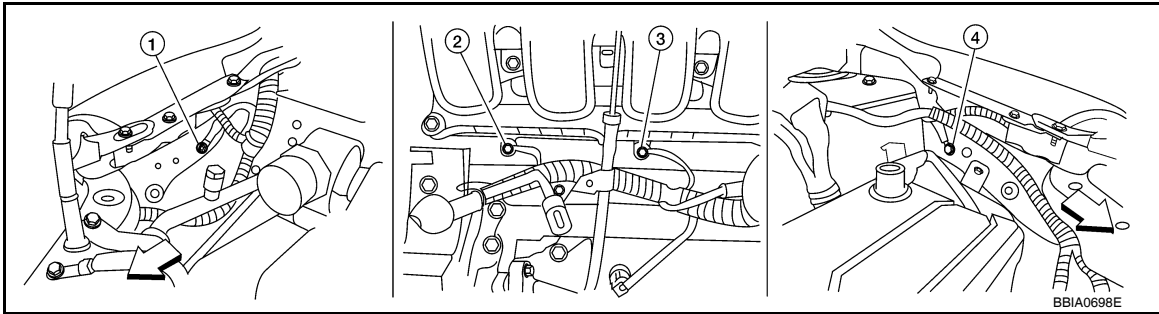
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to [EC-849. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005532701

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
Refer to [EC-638. "Ground Inspection"](#).



← Vehicle front

1. Body ground E24
2. Engine ground F9
3. engine ground F16
4. Body ground E15

OK or NG

- OK >> GO TO 2.
- NG >> Repair or replace ground connections.

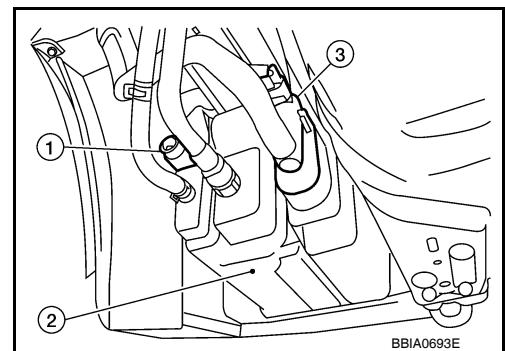
2. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

1. Disconnect EVAP control system pressure sensor (1) harness connector.
 - EVAP canister (2)
 - EVAP canister vent control valve (3)
2. Check sensor harness connector for water.

Water should not exist.

OK or NG

- OK >> GO TO 3.
- NG >> Repair or replace harness connector.



3. CHECK COMPONENTS POWER SUPPLY

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
74	Refrigerant pressure sensor terminal 3	EC-1029. "Wiring Diagram"
75	Crankshaft position sensor (POS) terminal 1	EC-794. "Wiring Diagram"
76	EVAP control system pressure sensor terminal 3	EC-853. "Wiring Diagram"
102	APP sensor terminal 5	EC-972. "Wiring Diagram"

OK or NG

- OK >> GO TO 4.
- NG >> Repair short to ground or short to power in harness or connectors.

4. CHECK COMPONENTS

Check the following.

DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

[MR18DE]

< SERVICE INFORMATION >

- Refrigerant pressure sensor (Refer to [MTC-38](#).)
- Crankshaft position sensor (POS) (Refer to [EC-798](#), "Component Inspection".)

OK or NG

- OK >> GO TO 5.
- NG >> Replace malfunctioning components.

5. CHECK APP SENSOR

Refer to [EC-969](#), "Component Inspection".

OK or NG

- OK >> GO TO 7.
- NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-580](#), "Accelerator Pedal Released Position Learning".
3. Perform [EC-580](#), "Throttle Valve Closed Position Learning".
4. Perform [EC-580](#), "Idle Air Volume Learning".

>> **INSPECTION END**

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-850](#), "Component Inspection".

OK or NG

- OK >> GO TO 8.
- NG >> Replace EVAP control system pressure sensor.

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

For wiring diagram, refer to [EC-853](#), "Wiring Diagram".

>> **INSPECTION END**

Component Inspection

INFOID:000000005532702

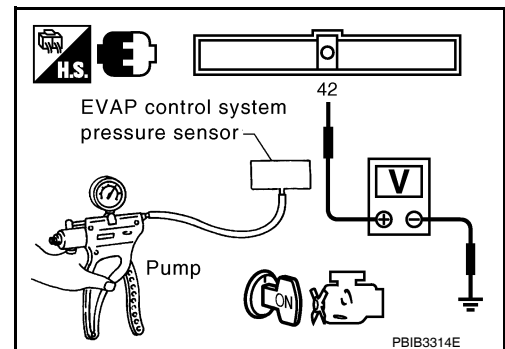
EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister.
Always replace O-ring with a new one.
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 42 (EVAP control system pressure sensor signal) and ground under the following conditions.

Applied vacuum kPa (mmHg, inHg)	Voltage (V)
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5 V lower than above value

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
 - Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).
4. If NG, replace EVAP control system pressure sensor.



DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

[MR18DE]

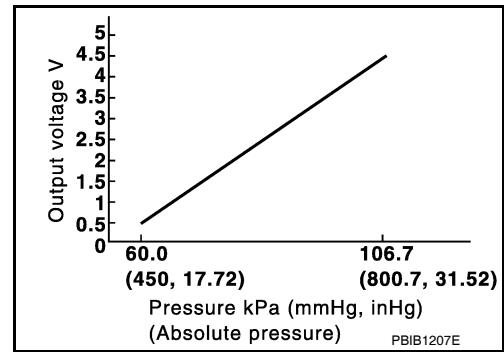
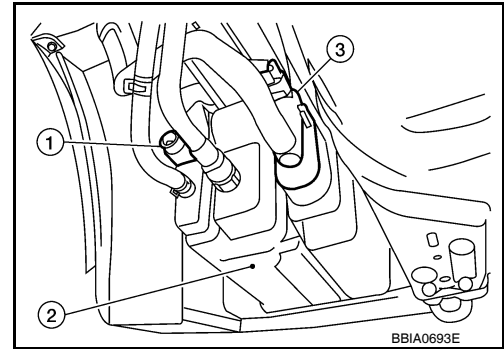
DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

Component Description

INFOID:000000005532703

The EVAP control system pressure sensor (1) detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.

- EVAP canister (2)
- EVAP canister vent control valve (3)



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532704

Specification data are reference values.

Monitor item	Condition	Specification
EVAP SYS PRES	• Ignition switch: ON	Approx. 1.8 - 4.8 V

On Board Diagnosis Logic

INFOID:000000005532705

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452 0452	EVAP control system pressure sensor low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Crankshaft position sensor (POS) • Accelerator pedal position sensor • Refrigerant pressure sensor

DTC Confirmation Procedure

INFOID:000000005532706

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

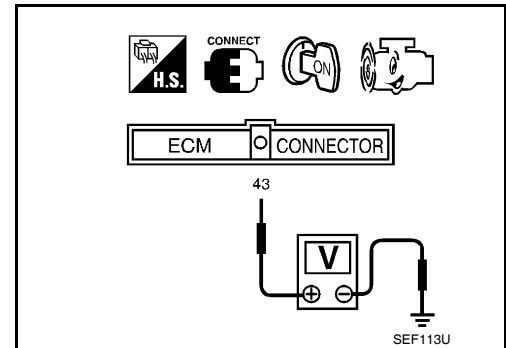
[MR18DE]

Ⓟ WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select "DATA MONITOR" mode with CONSULT-III.
5. Make sure that "FUEL T/TMP SE" is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to [EC-854. "Diagnosis Procedure"](#).

Ⓢ WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 43 (Fuel tank temperature sensor signal) and ground is less than 4.2 V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and wait at least 20 seconds.
5. Select Service \$07 with GST.
If 1st trip DTC is detected, go to [EC-854. "Diagnosis Procedure"](#).



DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

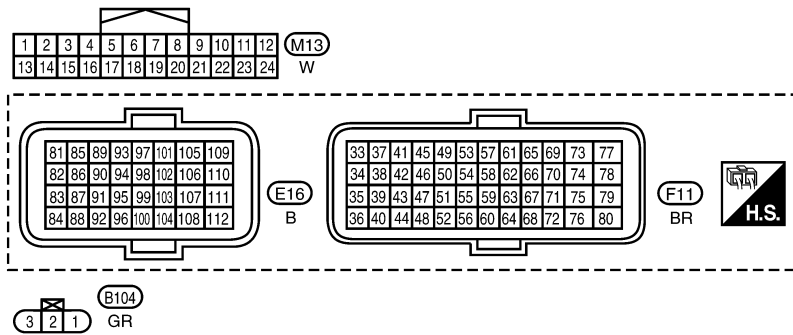
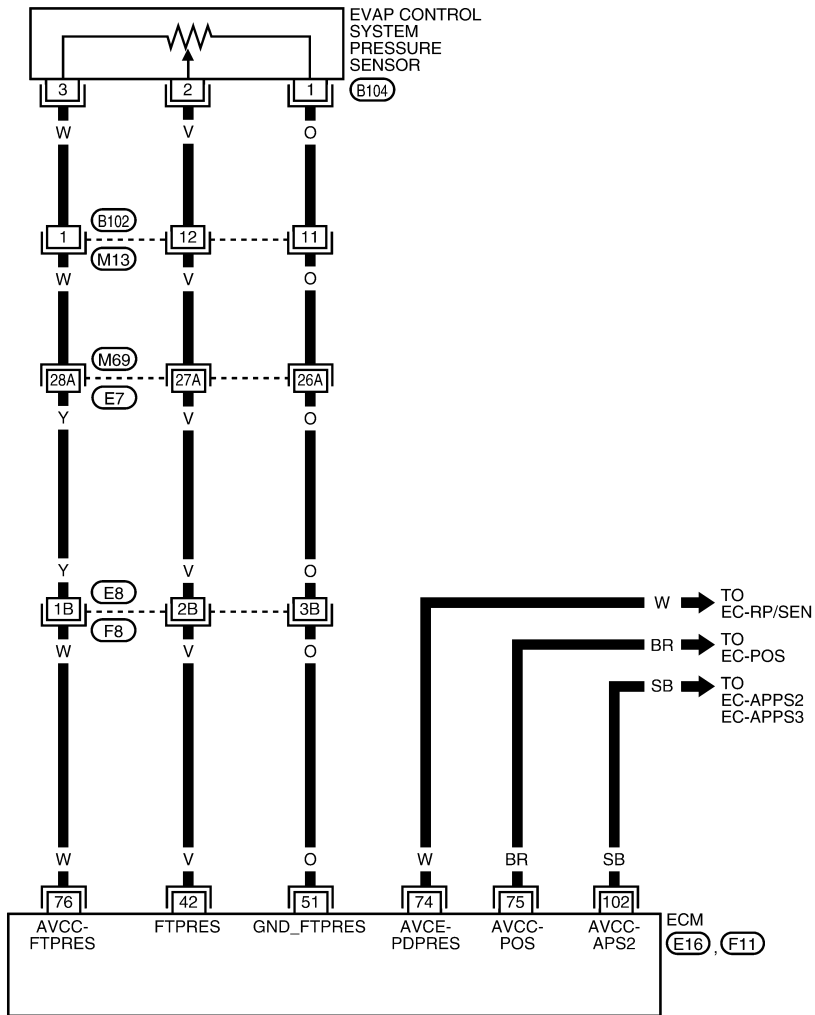
[MR18DE]

Wiring Diagram

INFOID:000000005532707

EC-PRE/SE-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
 (M69), (F8) - SUPER
 MULTIPLE JUNCTION (SMJ)

AABWA0225GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

[MR18DE]

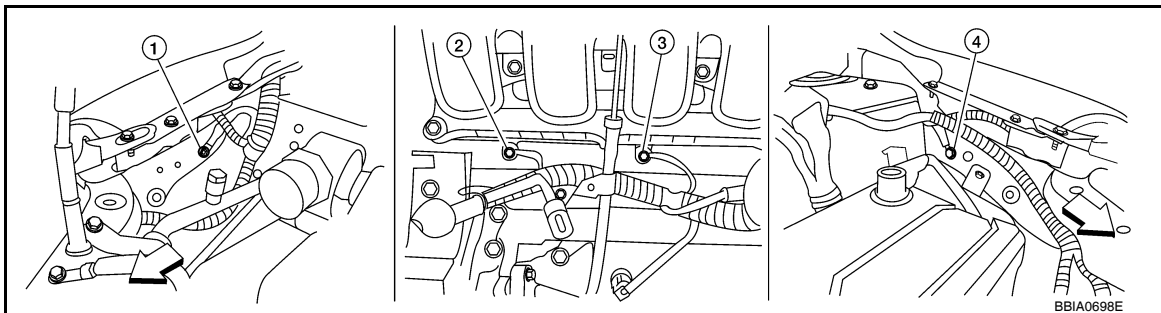
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	V	EVAP control system pressure sensor	[Ignition switch: ON]	Approximately 1.8 - 4.8 V
51	O	Sensor ground (EVAP control system pressure sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
74	W	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	Approximately 5 V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	[Ignition switch: ON]	Approximately 5 V
76	W	EVAP control system pressure sensor power supply	[Ignition switch: ON]	Approximately 5 V
102	SB	Sensor power supply (Accelerator pedal position sensor 2)	[Ignition switch: ON]	Approximately 5 V

Diagnosis Procedure

INFOID:000000005532708

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
Refer to [EC-638, "Ground Inspection"](#).



↙ Vehicle front

1. Body ground E24
4. Body ground E15

2. Engine ground F9

3. Engine ground F16

OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace ground connections.

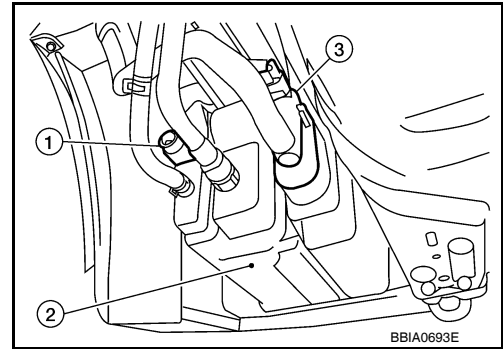
2. CHECK CONNECTOR

DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

[MR18DE]

< SERVICE INFORMATION >

1. Disconnect EVAP control system pressure sensor (1) harness connector.
 - EVAP canister (2)
 - EVAP canister vent control valve (3)
2. Check sensor harness connector for water.



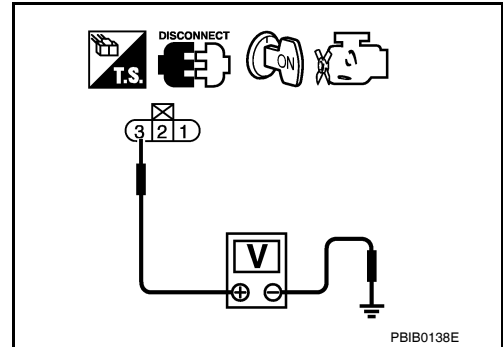
Water should not exist.

OK or NG

- OK >> GO TO 3.
NG >> Repair or replace harness connector.

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-III or tester.



Voltage: Approximately 5 V

OK or NG

- OK >> GO TO 5.
NG >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 3 and ECM terminal 76.

Continuity should exist.

OK or NG

- OK >> GO TO 7.
NG >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK COMPONENTS POWER SUPPLY

Check harness for short to power and short to ground, between the following terminals.

DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

[MR18DE]

ECM terminal	Sensor terminal	Reference Wiring Diagram
74	Refrigerant pressure sensor terminal 3	EC-1029, "Wiring Diagram"
75	Crankshaft position sensor (POS) terminal 1	EC-794, "Wiring Diagram"
76	EVAP control system pressure sensor terminal 3	EC-853, "Wiring Diagram"
102	APP sensor terminal 5	EC-972, "Wiring Diagram"

OK or NG

OK >> GO TO 8.

NG >> Repair short to ground or short to power in harness or connectors.

8. CHECK COMPONENTS

Check the following.

- Refrigerant pressure sensor (Refer to [MTC-38](#).)
- Crankshaft position sensor (POS) (Refer to [EC-798, "Component Inspection"](#).)

OK or NG

OK >> GO TO 9.

NG >> Replace malfunctioning components.

9. CHECK APP SENSOR

Refer to [EC-969, "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> GO TO 10.

10. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-580, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

11. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 51. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.

NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

[MR18DE]

< SERVICE INFORMATION >

1. Check harness continuity between ECM terminal 42 and EVAP control system pressure sensor terminal
2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 15.

NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between ECM and EVAP control system pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-850. "Component Inspection"](#).

OK or NG

OK >> GO TO 16.

NG >> Replace EVAP control system pressure sensor.

16. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005532709

EVAP CONTROL SYSTEM PRESSURE SENSOR

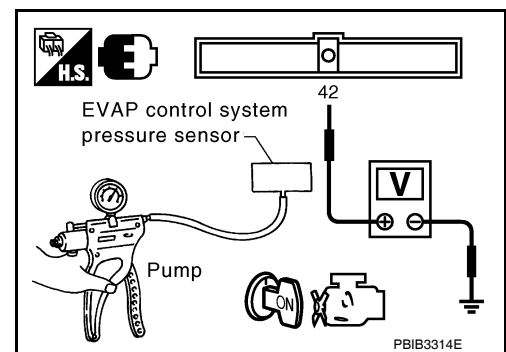
1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister.
Always replace O-ring with a new one.
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 42 (EVAP control system pressure sensor signal) and ground under the following conditions.

Applied vacuum kPa (mmHg, inHg)	Voltage (V)
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5 V lower than above value

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**

4. If NG, replace EVAP control system pressure sensor.



DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

[MR18DE]

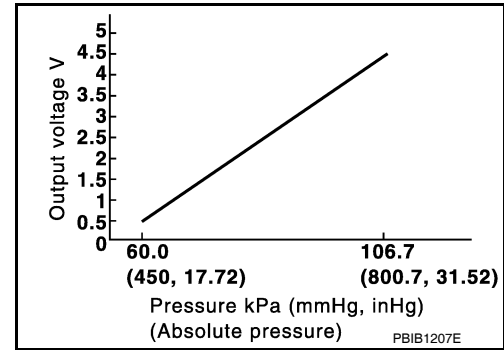
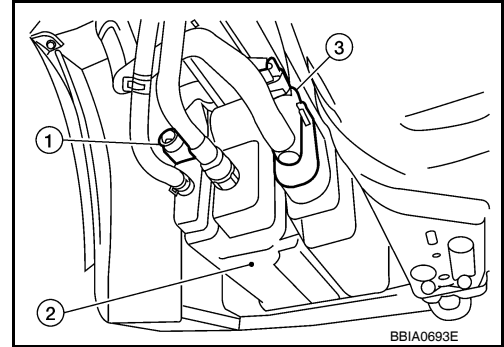
DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

Component Description

INFOID:000000005532710

The EVAP control system pressure sensor (1) detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.

- EVAP canister (2)
- EVAP canister vent control valve (3)



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532711

Specification data are reference values.

Monitor item	Condition	Specification
EVAP SYS PRES	• Ignition switch: ON	Approx. 1.8 - 4.8 V

On Board Diagnosis Logic

INFOID:000000005532712

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0453 0453	EVAP control system pressure sensor high input	An excessively high voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Crankshaft position sensor (POS) • Accelerator pedal position sensor • Refrigerant pressure sensor • EVAP canister vent control valve • EVAP canister • Drain filter • Rubber hose to EVAP canister vent control valve

DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

[MR18DE]

DTC Confirmation Procedure

INFOID:000000005532713

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

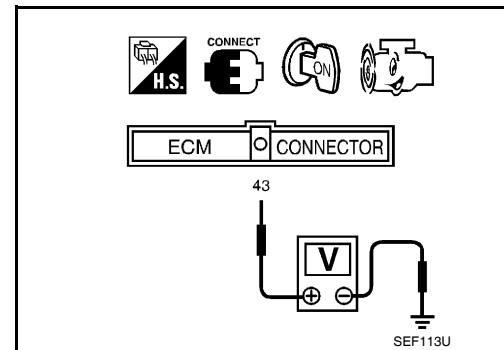
Always perform test at a temperature of 5°C (41°F) or more.

① WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select "DATA MONITOR" mode with CONSULT-III.
5. Make sure that "FUEL T/TMP SE" is more than 0°C (32°F).
6. Wait at least 10 seconds.
7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to [EC-861, "Diagnosis Procedure"](#).

② WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 43 (Fuel tank temperature sensor signal) and ground is less than 4.2 V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Wait at least 10 seconds.
5. Select Service \$07 with GST.
If 1st trip DTC is detected, go to [EC-861, "Diagnosis Procedure"](#).



DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

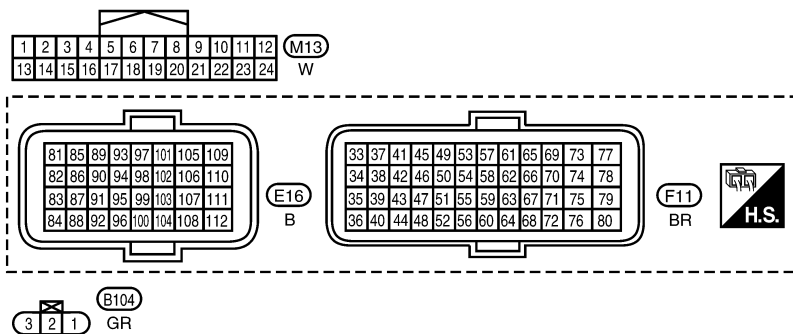
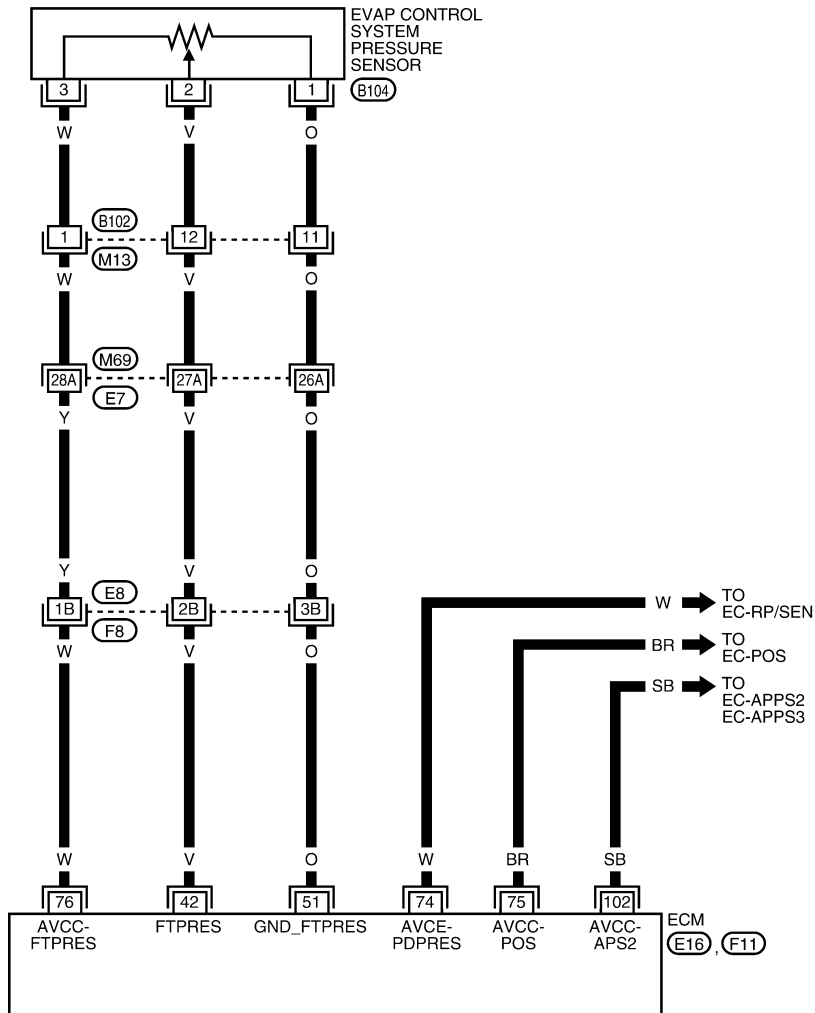
[MR18DE]

Wiring Diagram

INFOID:000000005532714

EC-PRE/SE-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
 (M69), (F8) - SUPER
 MULTIPLE JUNCTION (SMJ)

AABWA0225GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

[MR18DE]

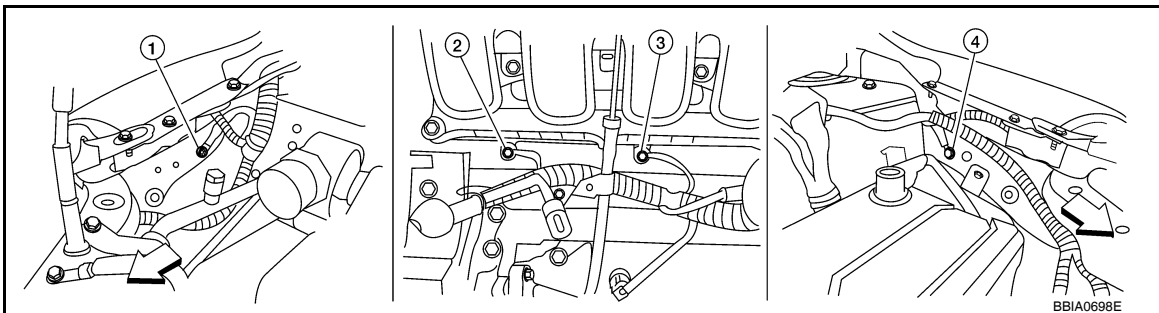
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	V	EVAP control system pressure sensor	[Ignition switch: ON]	Approximately 1.8 - 4.8 V
51	O	Sensor ground (EVAP control system pressure sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
74	W	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	Approximately 5 V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	[Ignition switch: ON]	Approximately 5 V
76	W	EVAP control system pressure sensor power supply	[Ignition switch: ON]	Approximately 5 V
102	SB	Sensor power supply (Accelerator pedal position sensor 2)	[Ignition switch: ON]	Approximately 5 V

Diagnosis Procedure

INFOID:000000005532715

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
Refer to [EC-638, "Ground Inspection"](#).



↔ Vehicle front

- | | | |
|----------------------|---------------------|----------------------|
| 1. Engine ground E24 | 2. Engine ground F9 | 3. Engine ground F16 |
| 4. Body ground E15 | | |

OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace ground connections.

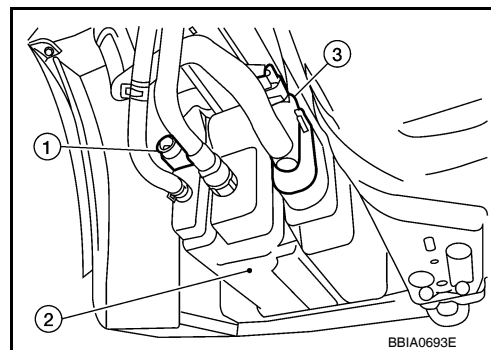
2. CHECK CONNECTOR

DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

[MR18DE]

< SERVICE INFORMATION >

1. Disconnect EVAP control system pressure sensor (1) harness connector.
 - EVAP canister (2)
 - EVAP canister vent control valve (3)
2. Check sensor harness connector for water.



Water should not exist.

OK or NG

- OK >> GO TO 3.
- NG >> Repair or replace harness connector.

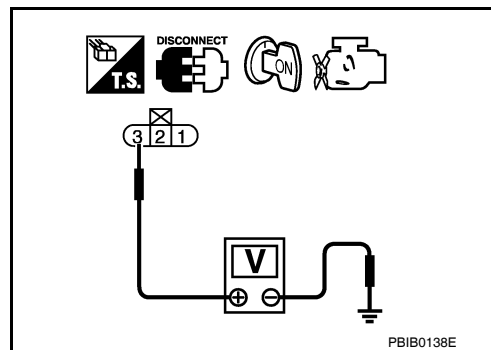
3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V

OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 3 and ECM terminal 76.

Continuity should exist.

OK or NG

- OK >> GO TO 7.
- NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK COMPONENTS POWER SUPPLY

Check harness for short to power and short to ground, between the following terminals.

DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

[MR18DE]

ECM terminal	Sensor terminal	Reference Wiring Diagram
74	Refrigerant pressure sensor terminal 3	EC-1029, "Wiring Diagram"
75	Crankshaft position sensor (POS) terminal 1	EC-794, "Wiring Diagram"
76	EVAP control system pressure sensor terminal 3	EC-853, "Wiring Diagram"
102	APP sensor terminal 5	EC-972, "Wiring Diagram"

OK or NG

OK >> GO TO 8.

NG >> Repair short to ground or short to power in harness or connectors.

8. CHECK COMPONENTS

Check the following.

- Refrigerant pressure sensor (Refer to [MTC-38](#).)
- Crankshaft position sensor (POS) (Refer to [EC-798, "Component Inspection"](#).)

OK or NG

OK >> GO TO 9.

NG >> Replace malfunctioning components.

9. CHECK APP SENSOR

Refer to [EC-969, "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> GO TO 10.

10. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-580, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

11. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 51. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.

NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E85, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

[MR18DE]

< SERVICE INFORMATION >

1. Check harness continuity between ECM terminal 42 and EVAP control system pressure sensor terminal
2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 15.

NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between ECM and EVAP control system pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK RUBBER TUBE

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging, vent and kinked.

OK or NG

OK >> GO TO 16.

NG >> Clean the rubber tube using an air blower, repair or replace rubber tube.

16. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-840, "Component Inspection"](#).

OK or NG

OK >> GO TO 17.

NG >> Replace EVAP canister vent control valve.

17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-850, "Component Inspection"](#).

OK or NG

OK >> GO TO 18.

NG >> Replace EVAP control system pressure sensor.

18. CHECK DRAIN FILTER

Refer to [EC-814, "Component Inspection"](#).

OK or NG

OK >> GO TO 19.

NG >> Replace drain filter.

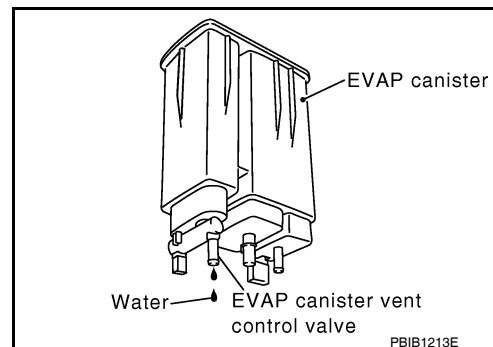
19. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 20.

No >> GO TO 22.



DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

[MR18DE]

20. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK >> GO TO 22.

NG >> GO TO 21.

21. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose connected to EVAP canister for clogging or poor connection

>> Repair hose or replace EVAP canister.

22. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005532716

EVAP CONTROL SYSTEM PRESSURE SENSOR

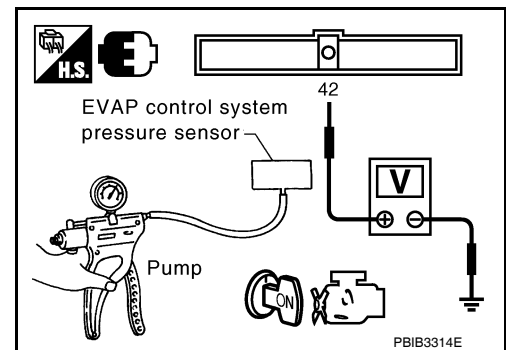
1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 42 (EVAP control system pressure sensor signal) and ground under the following conditions.

Applied vacuum kPa (mmHg, inHg)	Voltage (V)
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5 V lower than above value

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**

4. If NG, replace EVAP control system pressure sensor.



DTC P0455 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

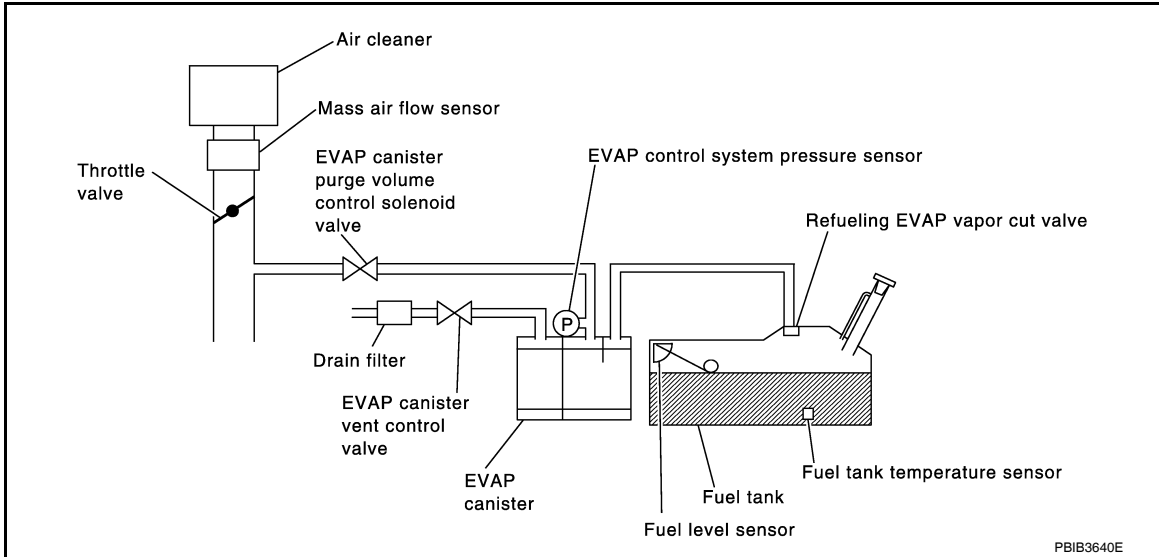
[MR18DE]

DTC P0455 EVAP CONTROL SYSTEM

On Board Diagnosis Logic

INFOID:000000005532717

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0455 0455	EVAP control system gross leak detected	<ul style="list-style-type: none"> EVAP control system has a very large leak such as fuel filler cap fell off. EVAP control system does not operate properly. 	<ul style="list-style-type: none"> Fuel filler cap remains open or fails to close. Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Foreign matter caught in fuel filler cap. Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. Foreign matter caught in EVAP canister vent control valve. EVAP canister or fuel tank leaks EVAP purge line (pipe and rubber tube) leaks EVAP purge line rubber tube bent. Loose or disconnected rubber tube EVAP canister vent control valve and the circuit Drain filter EVAP canister purge volume control solenoid valve and the circuit Fuel tank temperature sensor O-ring of EVAP canister vent control valve is missing or damaged. EVAP control system pressure sensor Refueling EVAP vapor cut valve ORVR system leaks

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC Confirmation Procedure

INFOID:000000005532718

CAUTION:

Never remove fuel filler cap during the DTC Confirmation Procedure.

DTC P0455 EVAP CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

NOTE:

- Make sure that EVAP hose are connected to EVAP canister purge volume control solenoid valve properly.
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedure.

Ⓜ WITH CONSULT-III

1. Tighten fuel filler cap securely until reteaching sound is heard.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
5. Make sure that the following conditions are met.
COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
INT/A TEMP SE: 0 - 60°C (32 - 140°F)
6. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
Follow the instruction displayed.
NOTE:
If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to [EC-574, "Basic Inspection"](#).
7. Make sure that "OK" is displayed.
If "NG" is displayed, select "SELF-DIAG RESULTS" mode with CONSULT-III and make sure that "EVAP GROSS LEAK [P0455]" is displayed. If it is displayed, refer to [EC-867, "Diagnosis Procedure"](#).
If P0442 is displayed, perform Diagnostic Procedure for DTC P0442, [EC-816, "Diagnosis Procedure"](#).

Ⓜ WITH GST

NOTE:

Be sure to read the explanation of Driving Pattern on [EC-542, "Emission-related Diagnostic Information"](#) before driving vehicle.

1. Start engine.
 2. Drive vehicle according to Driving Pattern, [EC-542, "Emission-related Diagnostic Information"](#).
 3. Stop vehicle.
 4. Turn ignition switch OFF, wait at least 10 seconds and then turn ignition switch ON.
 5. Select Service \$07 with GST.
- If P0441 is displayed on the screen, go to [EC-811, "Diagnosis Procedure"](#) for DTC P0441.
 - If P0442 is displayed on the screen, go to [EC-816, "Diagnosis Procedure"](#) for DTC P0442.
 - If P0455 is displayed on the screen, go to [EC-867, "Diagnosis Procedure"](#).

Diagnosis Procedure

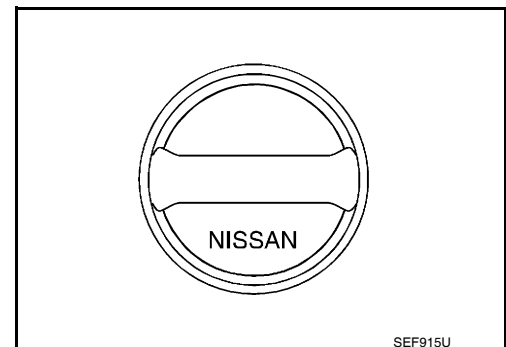
INFOID:000000005532719

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.

OK or NG

- OK >> GO TO 2.
- NG >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

DTC P0455 EVAP CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.

NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. Retighten until rereaching sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 5.

NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to [EC-527. "Component Inspection"](#).

OK or NG

OK >> GO TO 5.

NG >> Replace fuel filler cap with a genuine one.

5. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection.

Refer to [EC-525](#).

OK or NG

OK >> GO TO 6.

NG >> Repair or reconnect the hose.

6. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 7.

7. CHECK DRAIN FILTER

Refer to [EC-872. "Component Inspection"](#).

OK or NG

OK >> GO TO 8.

NG >> Replace drain filter.

8. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control is installed properly.
Refer to [EC-529. "Removal and Installation"](#).
- EVAP canister vent control valve.
Refer to [EC-840. "Component Inspection"](#).

OK or NG

OK >> GO TO 9.

NG >> Repair or replace EVAP canister vent control valve and O-ring.

9. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely. For the location of EVAP service port (2), refer to [EC-525. "Description"](#).

- EVAP canister purge volume control solenoid valve (1)

DTC P0455 EVAP CONTROL SYSTEM

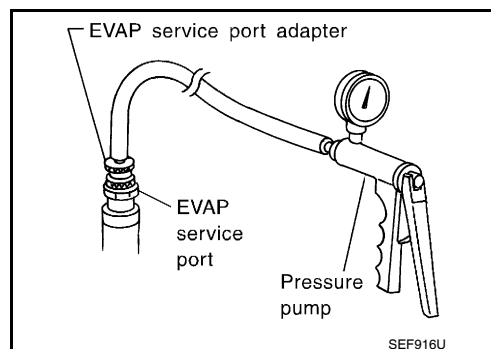
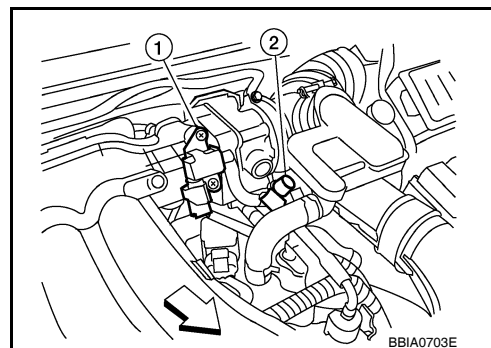
[MR18DE]

< SERVICE INFORMATION >

• ⇐: Vehicle front

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.



With CONSULT-III>>GO TO 10.
Without CONSULT-III>>GO TO 11.

10. CHECK FOR EVAP LEAK

Ⓜ With CONSULT-III

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-III.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

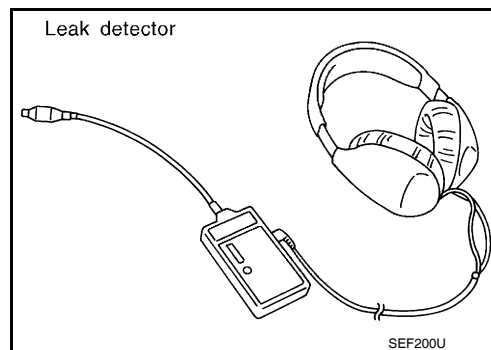
CAUTION:

- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
Refer to [EC-525, "Description"](#).

OK or NG

- OK >> GO TO 12.
NG >> Repair or replace.



11. CHECK FOR EVAP LEAK

ⓧ Without CONSULT-III

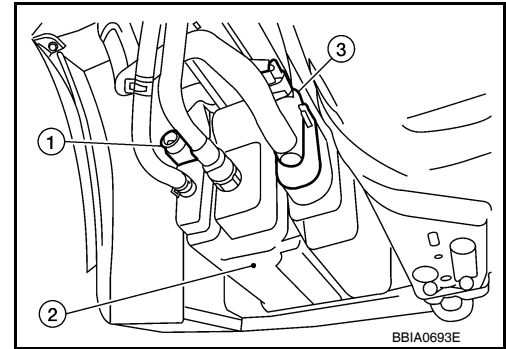
1. Turn ignition switch OFF.

DTC P0455 EVAP CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

2. Apply 12 volts DC to EVAP canister vent control valve (3). The valve will close. (Continue to apply 12 volts until the end of test.)
 - EVAP control system pressure sensor (1)
 - EVAP canister (2)



3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

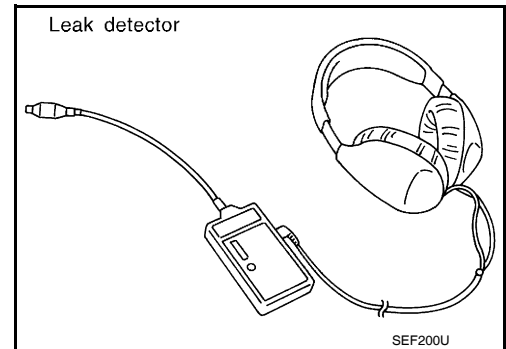
CAUTION:

- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-525, "Description"](#).

OK or NG

- OK >> GO TO 13.
- NG >> Repair or replace.



12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Ⓟ With CONSULT-III

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-III screen to increase "PURG VOL CONT/V" opening to 100%.
5. Check vacuum hose for vacuum.

Vacuum should exist.

OK or NG

- OK >> GO TO 15.
- NG >> GO TO 14.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

ⓧ Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

- OK >> GO TO 16.
- NG >> GO TO 14.

14. CHECK VACUUM HOSE

DTC P0455 EVAP CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

Check vacuum hoses for clogging or disconnection. Refer to [EC-602. "Vacuum Hose Drawing"](#).

OK or NG

- OK (With CONSULT-III)>>GO TO 15.
- OK (Without CONSULT-III)>>GO TO 16.
- NG >> Repair or reconnect the hose.

15.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

 **With CONSULT-III**

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

OK or NG

- OK >> GO TO 17.
- NG >> GO TO 16.

16.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-829. "Component Inspection"](#).

OK or NG

- OK >> GO TO 17.
- NG >> Replace EVAP canister purge volume control solenoid valve.

17.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to [EC-773. "Component Inspection"](#).

OK or NG

- OK >> GO TO 18.
- NG >> Replace fuel level sensor unit.

18.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-850. "Component Inspection"](#).

OK or NG

- OK >> GO TO 19.
- NG >> Replace EVAP control system pressure sensor.

19.CHECK EVAP/ORVR LINE

Check refueling EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to [EC-532](#).

OK or NG

- OK >> GO TO 20.
- >> Repair or replace hoses and tubes.

20.CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

- OK >> GO TO 21.
- >> Repair or replace hoses, tubes or filler neck tube.

21.CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to [EC-535. "Component Inspection"](#).

OK or NG

- OK >> GO TO 22.
- >> Replace refueling EVAP vapor cut valve with fuel tank.

22.CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

DTC P0455 EVAP CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

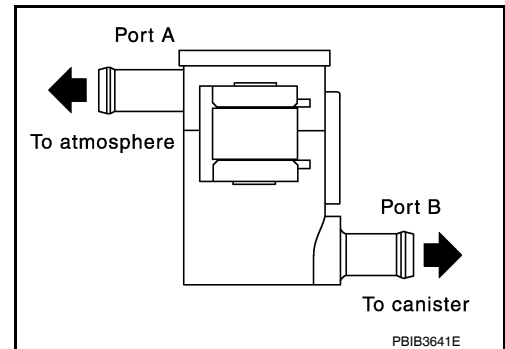
>> INSPECTION END

Component Inspection

INFOID:000000005532720

DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.
7. If NG, replace drain filter.



DTC P0456 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

[MR18DE]

DTC P0456 EVAP CONTROL SYSTEM

On Board Diagnosis Logic

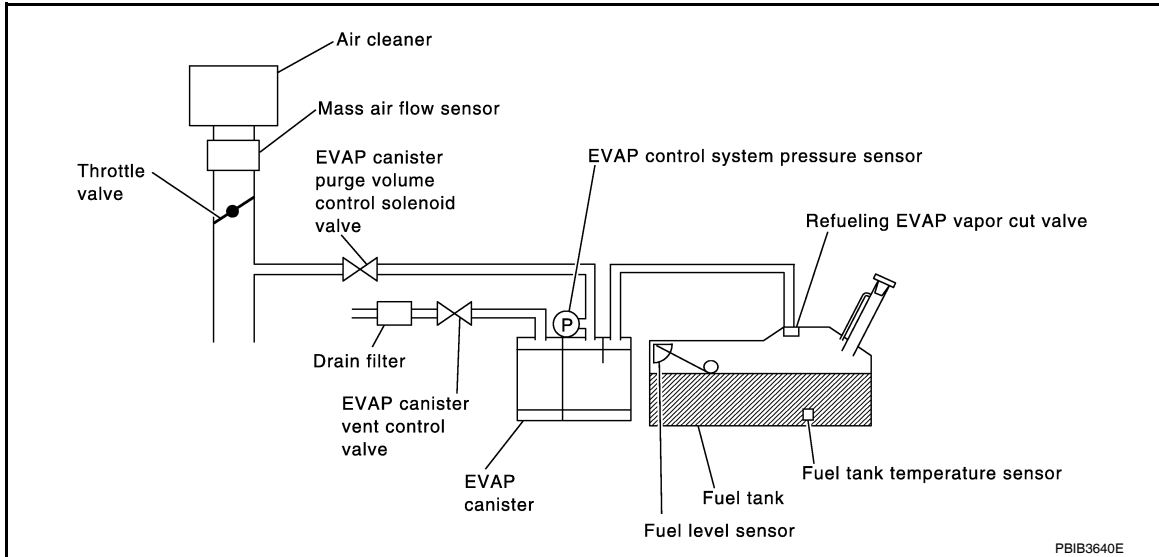
INFOID:000000005532721

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.

If ECM judges a leak which corresponds to a very small leak, the very small leak P0456 will be detected.

If ECM judges a leak equivalent to a small leak, EVAP small leak P0442 will be detected.

If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0456 0456	Evaporative emission control system very small leak (negative pressure check)	<ul style="list-style-type: none"> • EVAP system has a very small leak. • EVAP system does not operate properly. 	<ul style="list-style-type: none"> • Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Fuel tank temperature sensor • Drain filter • O-ring of EVAP canister vent control valve is missing or damaged • EVAP canister is saturated with water • EVAP control system pressure sensor • Refueling EVAP vapor cut valve • ORVR system leaks • Fuel level sensor and the circuit • Foreign matter caught in EVAP canister purge volume control solenoid valve

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC P0456 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

[MR18DE]

DTC Confirmation Procedure

INFOID:000000005532722

NOTE:

- If DTC P0456 is displayed with P0442, first perform trouble diagnosis for DTC P0456.
- After repair, make sure that the hoses and clips are installed properly.
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- Open engine hood before conducting following procedure.
- If any of following conditions are met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.
 - Fuel filler cap is removed.
 - Refilled or drained the fuel.
 - EVAP component parts is/are removed.
- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

Ⓜ WITH CONSULT-III

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
2. Make sure the following conditions are met.
 - FUEL LEVEL SE: 0.25 - 1.4 V**
 - COOLAN TEMP/S: 0 - 32°C (32 - 90°F)**
 - FUEL T/TMP SE: 0 - 35°C (32 - 95°F)**
 - INT/A TEMP SE: More than 0°C (32°F)**If NG, turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the "FUEL LEVEL SE" meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select "EVAP V/S LEAK P0456" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
Follow the instruction displayed.
6. Make sure that "OK" is displayed.
If "NG" is displayed, refer to [EC-875, "Diagnosis Procedure"](#).

NOTE:

- If the engine speed cannot be maintained within the range displayed on CONSULT-III screen, go to [EC-574, "Basic Inspection"](#).
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

Overall Function Check

INFOID:000000005532723

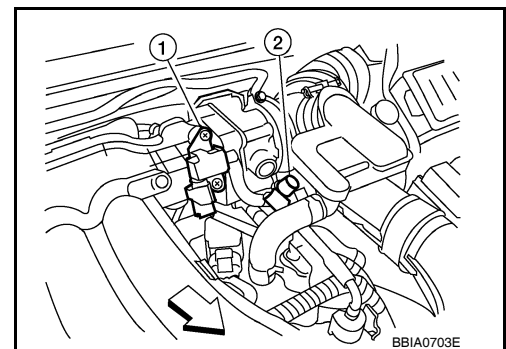
Ⓜ WITH GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

CAUTION:

- Never use compressed air, doing so may damage the EVAP system.
- Do not start engine.
- Do not exceeded 4.12 kPa (0.042 kg/cm², 0.6 psi).

1. Attach the EVAP service port adapter securely to the EVAP service port (2).
 - EVAP canister purge volume control solenoid valve (1)
 - ↶: Vehicle front



DTC P0456 EVAP CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

2. Set the pressure pump and a hose.
3. Also set the pressure pump with pressure gauge to the EVAP service port adapter.
4. Turn ignition switch ON.
5. Connect GST and select Service \$08.
6. Using Service \$08 control the EVAP canister vent control valve (close).
7. Apply pressure and make sure the following conditions are satisfied.

Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)

Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg).

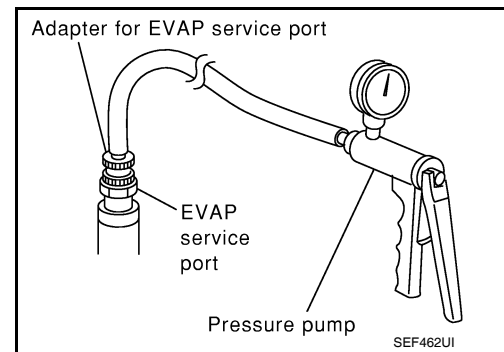
If NG, go to [EC-875, "Diagnosis Procedure"](#).

If OK, go to next step.

8. Disconnect GST.
9. Start engine and warm it up to normal operating temperature.
10. Turn ignition switch OFF and wait at least 10 seconds.
11. Restart engine and let it idle for 90 seconds.
12. Keep engine speed at 2,000 rpm for 30 seconds.
13. Turn ignition switch OFF.

NOTE:

For more information, refer to GST Instruction Manual.



Diagnosis Procedure

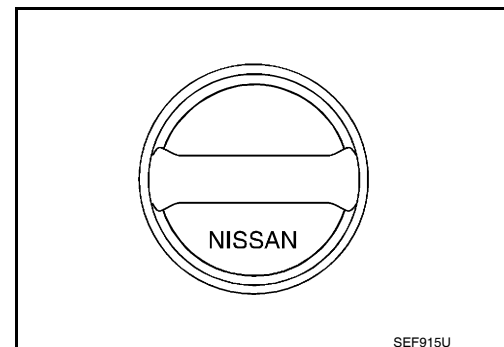
INFOID:000000005532724

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.

OK or NG

- OK >> GO TO 2.
- NG >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

- OK >> GO TO 3.
- NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. Retighten until reteaching sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to [EC-527, "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.
- NG >> Replace fuel filler cap with a genuine one.

DTC P0456 EVAP CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

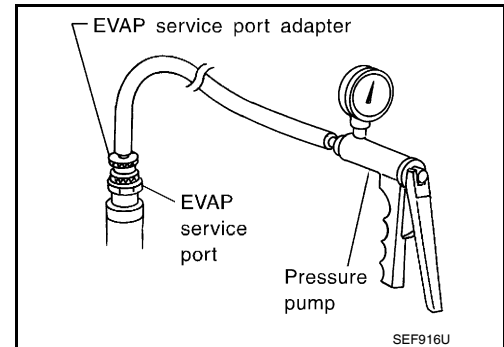
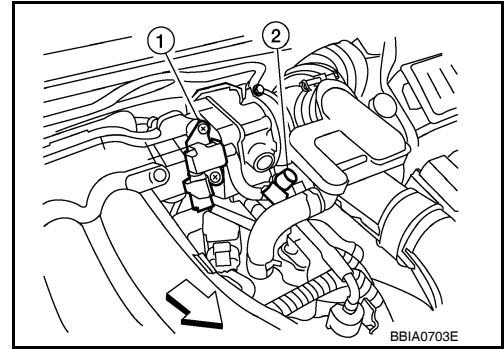
5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely. For the location of EVAP service port (2), refer to [EC-525, "Description"](#).

- EVAP canister purge volume control solenoid valve (1)
- ↵: Vehicle front

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.



With CONSULT-III>>GO TO 6.
Without CONSULT-III>>GO TO 7.

6. CHECK FOR EVAP LEAK

With CONSULT-III

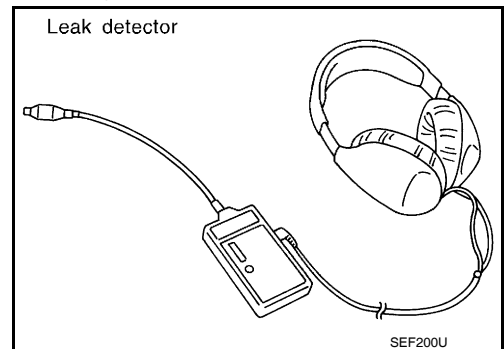
1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-III.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

CAUTION:

- **Never use compressed air or a high pressure pump.**
 - **Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.**
4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
Refer to [EC-525, "Description"](#).

OK or NG

- OK >> GO TO 8.
NG >> Repair or replace.



7. CHECK FOR EVAP LEAK

Without CONSULT-III

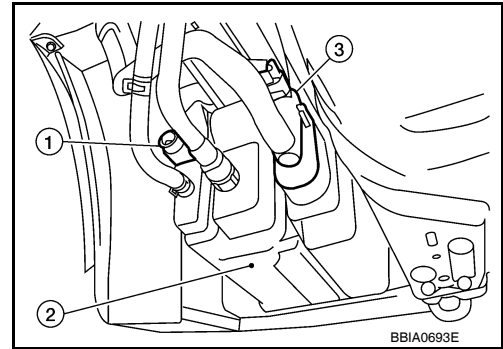
1. Turn ignition switch OFF.

DTC P0456 EVAP CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

2. Apply 12 volts DC to EVAP canister vent control valve (3). The valve will close. (Continue to apply 12 volts until the end of test.)
 - EVAP control system pressure sensor (1)
 - EVAP canister (2)



3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

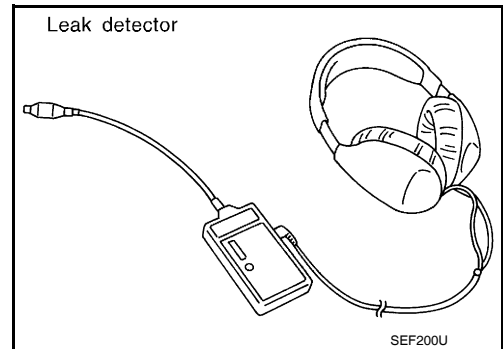
CAUTION:

- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-525. "Description"](#).

OK or NG

- OK >> GO TO 8.
- NG >> Repair or replace.



8. CHECK DRAIN FILTER

Refer to [EC-880. "Component Inspection"](#).

OK or NG

- OK >> GO TO 9.
- NG >> Replace drain filter.

9. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly. Refer to [EC-529. "Removal and Installation"](#).
- EVAP canister vent control valve. Refer to [EC-840. "Component Inspection"](#).

OK or NG

- OK >> GO TO 10.
- NG >> Repair or replace EVAP canister vent control valve and O-ring.

10. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

DTC P0456 EVAP CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

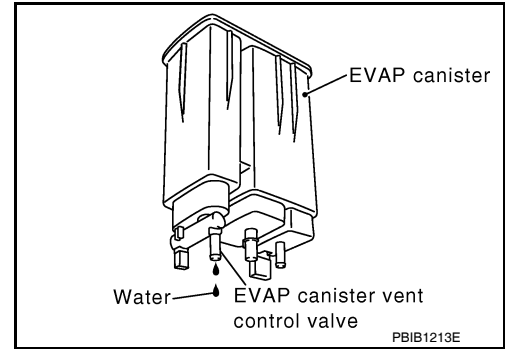
2. Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 11.

No (With CONSULT-III)>>GO TO 13.

No (Without CONSULT-III)>>GO TO 14.



11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK (With CONSULT-III)>>GO TO 13.

OK (Without CONSULT-III)>>GO TO 14.

NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Ⓟ With CONSULT-III

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-III screen to increase "PURG VOL CONT/V" opening to 100%.
5. Check vacuum hose for vacuum.

Vacuum should exist.

OK or NG

OK >> GO TO 16.

NG >> GO TO 15.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

ⓧ Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK >> GO TO 17.

NG >> GO TO 15.

15. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to [EC-602, "Vacuum Hose Drawing"](#).

OK or NG

DTC P0456 EVAP CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

- OK >> GO TO 16.
- NG >> Repair or reconnect the hose.

16. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-829. "Component Inspection"](#).

OK or NG

- OK >> GO TO 17.
- NG >> Replace EVAP canister purge volume control solenoid valve.

17. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to [EC-773. "Component Inspection"](#).

OK or NG

- OK >> GO TO 18.
- NG >> Replace fuel level sensor unit.

18. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-850. "Component Inspection"](#).

OK or NG

- OK >> GO TO 19.
- NG >> Replace EVAP control system pressure sensor.

19. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.

Refer to [EC-525. "Description"](#).

OK or NG

- OK >> GO TO 20.
- NG >> Repair or reconnect the hose.

20. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 21.

21. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to [EC-532](#).

OK or NG

- OK >> GO TO 22.
- NG >> Repair or replace hoses and tubes.

22. CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

- OK >> GO TO 23.
- NG >> Repair or replace hose, tube or filler neck tube.

23. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to [EC-535. "Component Inspection"](#).

OK or NG

- OK >> GO TO 24.
- NG >> Replace refueling EVAP vapor cut valve with fuel tank.

24. CHECK FUEL LEVEL SENSOR

Refer to [DI-20](#).

OK or NG

- OK >> GO TO 25.

DTC P0456 EVAP CONTROL SYSTEM

[MR18DE]

< SERVICE INFORMATION >

NG >> Replace fuel level sensor unit.

25. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

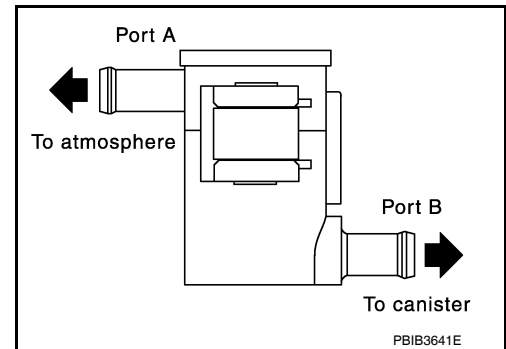
>> **INSPECTION END**

Component Inspection

INFOID:000000005532725

DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.
7. If NG, replace drain filter.



DTC P0460 FUEL LEVEL SENSOR

< SERVICE INFORMATION >

[MR18DE]

DTC P0460 FUEL LEVEL SENSOR

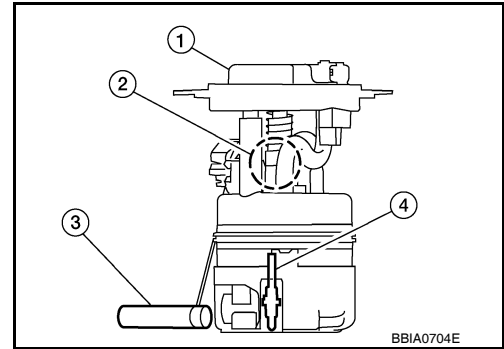
Component Description

INFOID:000000005532726

The fuel level sensor (3) is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel tank temperature sensor (4)



On Board Diagnosis Logic

INFOID:000000005532727

NOTE:

- If DTC P0460 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0460 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to [EC-895](#).

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0460 0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	<ul style="list-style-type: none">• Harness or connectors (CAN communication line is open or shorted)• Harness or connectors (Fuel level sensor circuit is open or shorted)• Combination meter• Fuel level sensor

DTC Confirmation Procedure

INFOID:000000005532728

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Start engine and wait maximum of 2 consecutive minutes.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-881, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005532729

1. CHECK FUEL GAUGE OPERATION

Refer to [DI-11, "Self-Diagnosis Mode of Combination Meter"](#).

OK or NG

OK >> GO TO 2.

NG >> Follow the instruction of [DI-11, "Self-Diagnosis Mode of Combination Meter"](#).

2. CHECK FUEL LEVEL SENSOR AND CIRCUIT

Refer to [DI-17, "Fuel Level Sensor Signal Inspection"](#).

OK or NG

OK >> GO TO 3.

NG >> Repair or replace malfunctioning parts.

DTC P0460 FUEL LEVEL SENSOR

< SERVICE INFORMATION >

[MR18DE]

3. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

Removal and Installation

INFOID:000000005532730

FUEL LEVEL SENSOR

Refer to [FL-6, "Removal and Installation"](#).

DTC P0461 FUEL LEVEL SENSOR

< SERVICE INFORMATION >

[MR18DE]

DTC P0461 FUEL LEVEL SENSOR

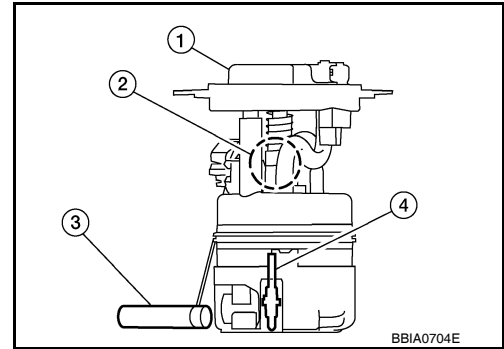
Component Description

INFOID:000000005532731

The fuel level sensor (3) is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel tank temperature sensor (4)



On Board Diagnosis Logic

INFOID:000000005532732

NOTE:

- If DTC P0461 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0461 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to [EC-895](#).

This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven. Driving long distances naturally affect fuel gauge level.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0461 0461	Fuel level sensor circuit range/performance	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.	<ul style="list-style-type: none"> • Harness or connectors (CAN communication line is open or shorted) • Harness or connectors (Fuel level sensor circuit is open or shorted) • Combination meter • Fuel level sensor

Overall Function Check

INFOID:000000005532733

Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

WARNING:

When performing following procedure, be sure to observe the handling of the fuel.

Refer to [GI-3, "General Precaution"](#).

TESTING CONDITION:

Before starting overall function check, preparation of draining fuel and refilling fuel is required.

WITH CONSULT-III

NOTE:

Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to [EC-582, "Fuel Pressure Check"](#).
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.
6. Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-III.
7. Check "FUEL LEVEL SE" output voltage and note it.
8. Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-III.
9. Touch "ON" and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10. Check "FUEL LEVEL SE" output voltage and note it.
11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).

DTC P0461 FUEL LEVEL SENSOR

[MR18DE]

< SERVICE INFORMATION >

12. Check "FUEL LEVEL SE" output voltage and note it.
13. Confirm whether the voltage changes more than 0.03 V during step 7 to 10 and 10 to 12.
If NG, go to [EC-884, "Diagnosis Procedure"](#).

 WITH GST

NOTE:

Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to [EC-582, "Fuel Pressure Check"](#).
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch ON.
6. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
7. Confirm that the fuel gauge indication varies.
8. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
9. Confirm that the fuel gauge indication varies.
10. If NG, go to [EC-884, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005532734

1. CHECK FUEL GAUGE OPERATION

Refer to [DI-11, "Self-Diagnosis Mode of Combination Meter"](#).

OK or NG

- OK >> GO TO 2.
- NG >> Follow the instruction of [DI-11, "Self-Diagnosis Mode of Combination Meter"](#).

2. CHECK FUEL LEVEL SENSOR AND CIRCUIT

Refer to [DI-17, "Fuel Level Sensor Signal Inspection"](#).

OK or NG

- OK >> GO TO 3.
- NG >> Repair or replace malfunctioning parts.

3. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

Removal and Installation

INFOID:000000005532735

FUEL LEVEL SENSOR

Refer to [FL-6, "Removal and Installation"](#).

DTC P0462, P0463 FUEL LEVEL SENSOR

< SERVICE INFORMATION >

[MR18DE]

DTC P0462, P0463 FUEL LEVEL SENSOR

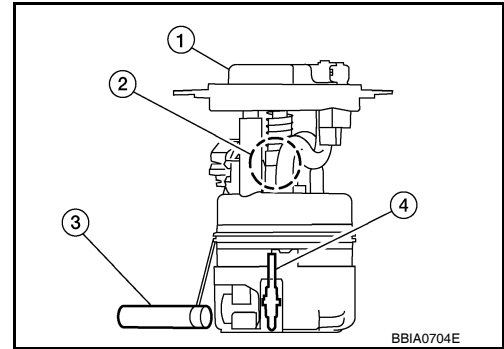
Component Description

INFOID:000000005532736

The fuel level sensor (3) is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel level mechanical float.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel tank temperature sensor (4)



BBIA0704E

On Board Diagnosis Logic

INFOID:000000005532737

NOTE:

- If DTC P0462 or P0463 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0462 or P0463 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to [EC-895](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0462 0462	Fuel level sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none">• Harness or connectors (CAN communication line is open or shorted)• Harness or connectors (Fuel level sensor circuit is open or shorted)• Combination meter• Fuel level sensor
P0463 0463	Fuel level sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

INFOID:000000005532738

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at ignition switch ON.

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-885, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005532739

1. CHECK FUEL GAUGE OPERATION

Refer to [DI-11, "Self-Diagnosis Mode of Combination Meter"](#).

OK or NG

OK >> GO TO 2.

NG >> Follow the instruction of [DI-11, "Self-Diagnosis Mode of Combination Meter"](#).

2. CHECK FUEL LEVEL SENSOR AND CIRCUIT

Refer to [DI-17, "Fuel Level Sensor Signal Inspection"](#).

OK or NG

OK >> GO TO 3.

NG >> Repair or replace malfunctioning parts.

DTC P0462, P0463 FUEL LEVEL SENSOR

< SERVICE INFORMATION >

[MR18DE]

3. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

Removal and Installation

INFOID:000000005532740

FUEL LEVEL SENSOR

Refer to [FL-6, "Removal and Installation"](#).

DTC P0500 VSS

< SERVICE INFORMATION >

[MR18DE]

DTC P0500 VSS

Description

INFOID:000000005532741

NOTE:

- If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to [EC-895](#).

The vehicle speed signal is sent from “ABS actuator and electric unit (control unit)” or combination meter through CAN communication line

On Board Diagnosis Logic

INFOID:000000005532742

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500 0500	Vehicle speed sensor	The vehicle speed signal sent to ECM is almost km/h (0 MPH) even when vehicle is being driven.	<ul style="list-style-type: none">• Harness or connectors (CAN communication line is open or shorted.)• Harness or connectors (Vehicle speed signal circuit is open or shorted)• ABS actuator and electric unit (control unit)• Combination meter

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode.

Detected item	Engine operating condition in fail-safe mode
Vehicle speed sensor	The cooling fan operates (High) while engine is running.

DTC Confirmation Procedure

INFOID:000000005532743

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

④ WITH CONSULT-III

1. Start engine.
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-III. The vehicle speed on CONSULT-III should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
If NG, go to [EC-888, "Diagnosis Procedure"](#).
If OK, go to following step.
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Warm engine up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	More than 1,600 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	5.5 - 31.8 msec
Shift lever	Suitable position
PW/ST SIGNAL	OFF

6. Check 1st trip DTC.

7. If 1st trip DTC is detected, go to [EC-888, "Diagnosis Procedure"](#).

< SERVICE INFORMATION >

Overall Function Check

INFOID:000000005532744

Use this procedure to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed signal in Service \$01 with GST.
The vehicle speed signal on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4. If NG, go to [EC-888, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005532745

1.CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

Refer to [BRC-10](#).

OK or NG

- OK >> GO TO 2.
- NG >> Repair or replace.

2.CHECK COMBINATION METER

Refer to [DI-4](#).

>> **INSPECTION END**

DTC P0506 ISC SYSTEM

Description

INFOID:000000005532746

NOTE:

If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The ECM calculates the actual engine speed from signals of crankshaft position sensor (POS) and camshaft position sensor (PHASE).

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

On Board Diagnosis Logic

INFOID:000000005532747

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0506 0506	Idle speed control system RPM lower than expected	The idle speed is less than the target idle speed by 100 rpm or more.	<ul style="list-style-type: none"> • Electric throttle control actuator • Intake air leak

DTC Confirmation Procedure

INFOID:000000005532748

NOTE:

- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- If the target idle speed is out of the specified value, perform [EC-580, "Idle Air Volume Learning"](#), before conducting DTC Confirmation Procedure. For the target idle speed, refer to the [EC-1035](#).

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.
- Always perform the test at a temperature above -10°C (14°F).

1. Open engine hood.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and run it for at least 1 minute at idle speed.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-889, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005532749

1. CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

OK or NG

- OK >> GO TO 2.
- NG >> Discover air leak location and repair.

2. REPLACE ECM

1. Stop engine.
2. Replace ECM.
3. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to [BL-249, "ECM Re-communicating Function"](#).
4. Perform [EC-580, "VIN Registration"](#).
5. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).

DTC P0506 ISC SYSTEM

< SERVICE INFORMATION >

[MR18DE]

7. Perform [EC-580, "Idle Air Volume Learning"](#).

>> INSPECTION END

DTC P0507 ISC SYSTEM

Description

INFOID:000000005532750

NOTE:

If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The ECM calculates the actual engine speed from signals of camshaft position sensor (POS) and camshaft position sensor (PHASE).

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

On Board Diagnosis Logic

INFOID:000000005532751

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0507 0507	Idle speed control system RPM higher than expected	The idle speed is more than the target idle speed by 200 rpm or more.	<ul style="list-style-type: none"> • Electric throttle control actuator • Intake air leak • PCV system

DTC Confirmation Procedure

INFOID:000000005532752

NOTE:

- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- If the target idle speed is out of the specified value, perform [EC-580, "Idle Air Volume Learning"](#), before conducting DTC Confirmation Procedure. For the target idle speed, refer to the [EC-1035](#).

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.
- Always perform the test at a temperature above -10°C (14°F).

1. Open engine hood.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and run it for at least 1 minute at idle speed.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-891, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005532753

1. CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

OK or NG

- OK >> GO TO 2.
- NG >> Repair or replace.

2. CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

OK or NG

- OK >> GO TO 3.
- NG >> Discover air leak location and repair.

3. REPLACE ECM

1. Stop engine.

DTC P0507 ISC SYSTEM

< SERVICE INFORMATION >

[MR18DE]

2. Replace ECM.
3. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs.
Refer to [BL-249, "ECM Re-communicating Function"](#).
4. Perform [EC-580, "VIN Registration"](#).
5. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-580, "Idle Air Volume Learning"](#).

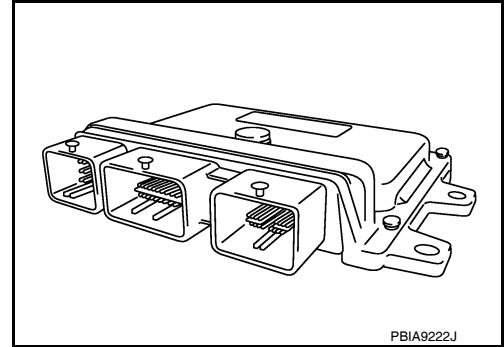
>> INSPECTION END

DTC P0605 ECM

Component Description

INFOID:000000005532754

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



On Board Diagnosis Logic

INFOID:000000005532755

This self-diagnosis has one or two trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605 0605	Engine control module	A)	ECM calculation function is malfunctioning.	• ECM
		B)	ECM EEPROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	

FAIL-SAFE MODE

ECM enters fail-safe mode when malfunction A is detected.

Detected items	Engine operation condition in fail-safe mode
Malfunction A	<ul style="list-style-type: none"> ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. ECM deactivates ASCD operation.

DTC Confirmation Procedure

INFOID:000000005532756

Perform **PROCEDURE FOR MALFUNCTION A** first. If the 1st trip DTC cannot be confirmed, perform **PROCEDURE FOR MALFUNCTION B**. If there is no malfunction on **PROCEDURE FOR MALFUNCTION B**, perform **PROCEDURE FOR MALFUNCTION C**.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

- Turn ignition switch ON.
- Check 1st trip DTC.
- If 1st trip DTC is detected, go to [EC-894. "Diagnosis Procedure"](#).

PROCEDURE FOR MALFUNCTION B

- Turn ignition switch ON and wait at least 1 second.
- Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- Check 1st trip DTC.
- If 1st trip DTC is detected, go to [EC-894. "Diagnosis Procedure"](#).

PROCEDURE FOR MALFUNCTION C

- Turn ignition switch ON and wait at least 1 second.
- Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- Repeat step 2 for 32 times.

< SERVICE INFORMATION >

4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to [EC-894, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005532757

1.INSPECTION START

1. Erase DTC.
2. **Perform DTC Confirmation Procedure.**
See [EC-893, "DTC Confirmation Procedure"](#).
3. Is the 1st trip DTC P0605 displayed again?

Yes or No

- Yes >> GO TO 2.
No >> **INSPECTION END**

2.REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS(NATS) system and registration of all NVIS(NATS) ignition key IDs.
Refer to [BL-249, "ECM Re-communicating Function"](#).
3. Perform [EC-580, "VIN Registration"](#).
4. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).
5. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
6. Perform [EC-580, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

DTC P0607 ECM

Description

INFOID:000000005532758

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

INFOID:000000005532759

**This self-diagnosis has the one trip detection logic (A/T and CVT).
The MIL will not light up for this self-diagnosis (M/T).**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0607 0607	CAN communication bus	When detecting error during the initial diagnosis for CAN controller of each control unit.	• ECM

DTC Confirmation Procedure

INFOID:000000005532760

1. Turn ignition switch ON.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-895, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005532761

1.INSPECTION START

1. Erase DTC.
2. Perform DTC Confirmation Procedure.
See [EC-895, "DTC Confirmation Procedure"](#).
3. Is the 1st trip DTC P0607 displayed again?

Yes or No

- Yes >> GO TO 2.
- No >> **INSPECTION END**

2.REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs.
Refer to [BL-249, "ECM Re-communicating Function"](#).
3. Perform [EC-580, "VIN Registration"](#).
4. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).
5. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
6. Perform [EC-580, "Idle Air Volume Learning"](#).

>> INSPECTION END

DTC P0643 SENSOR POWER SUPPLY

< SERVICE INFORMATION >

[MR18DE]

DTC P0643 SENSOR POWER SUPPLY

On Board Diagnosis Logic

INFOID:000000005532762

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0643 0643	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	<ul style="list-style-type: none">• Harness or connectors (APP sensor 1 circuit is shorted.) (Throttle position sensor circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.]• Accelerator pedal position sensor• Throttle position sensor• Camshaft position sensor (PHASE)

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:000000005532763

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

1. Start engine and let it idle for 1 second.
2. Check 1st trip DTC.
3. If DTC is detected, go to [EC-898. "Diagnosis Procedure"](#).

DTC P0643 SENSOR POWER SUPPLY

< SERVICE INFORMATION >

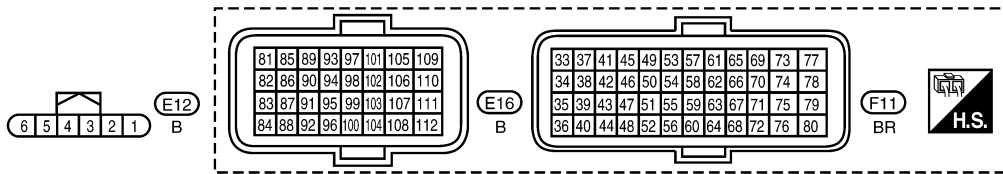
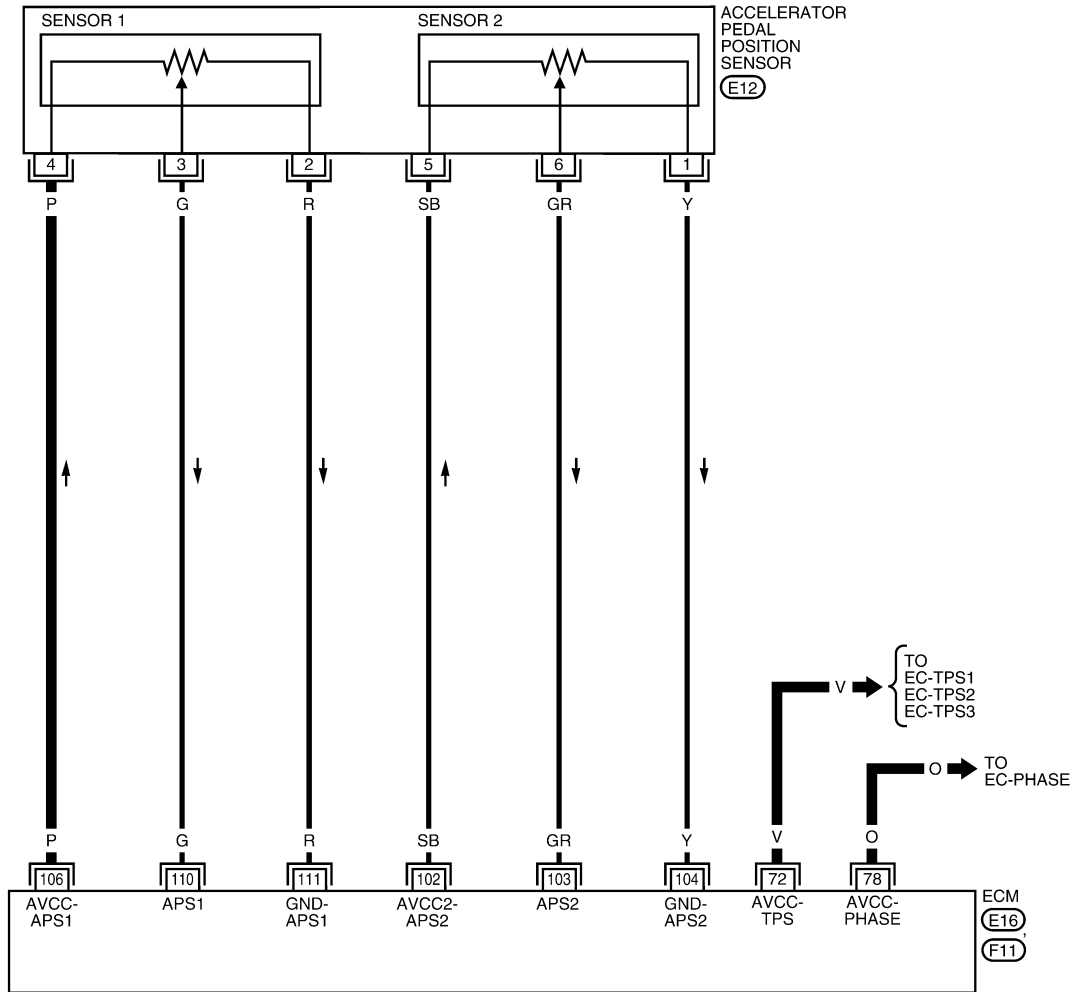
[MR18DE]

Wiring Diagram

INFOID:000000005532764

EC-SEN/PW-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA2649E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0643 SENSOR POWER SUPPLY

< SERVICE INFORMATION >

[MR18DE]

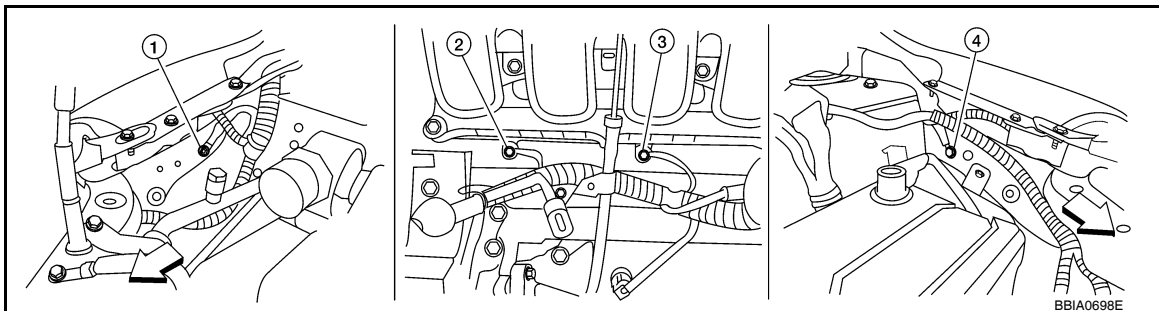
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
72	V	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5 V
78	O	Sensor power supply [Camshaft position sensor (PHASE)]	[Ignition switch: ON]	Approximately 5 V
102	SB	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5 V
103	GR	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6 V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4 V
104	Y	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
106	P	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5 V
110	G	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9 V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7 V
111	R	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V

Diagnosis Procedure

INFOID:000000005532765

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
Refer to [EC-638, "Ground Inspection"](#).



↶ Vehicle front

1. Body ground E24
4. Body ground E15

2. Engine ground F9

3. Engine ground F16

OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace ground connections.

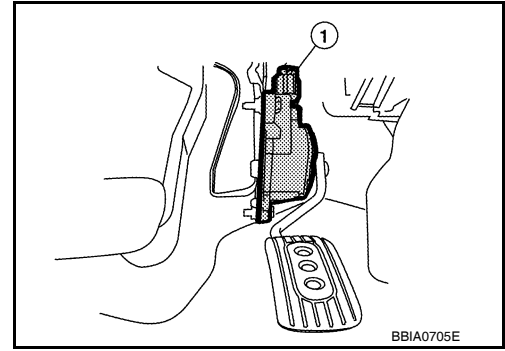
DTC P0643 SENSOR POWER SUPPLY

[MR18DE]

< SERVICE INFORMATION >

2. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.

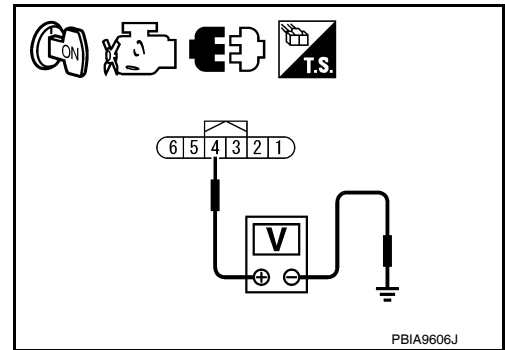


3. Check voltage between APP sensor terminal 4 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V

OK or NG

- OK >> GO TO 8.
- NG >> GO TO 3.



3. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 106. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

- OK >> GO TO 4.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
72	Throttle position sensor terminal 1	EC-978. "Wiring Diagram"
78	Camshaft position sensor (PHASE) terminal 1	EC-800. "Wiring Diagram"
106	APP sensor terminal 4	EC-897. "Wiring Diagram"

OK or NG

- OK >> GO TO 5.
- NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-803. "Component Inspection"](#).

OK or NG

- OK >> GO TO 6.
- NG >> Replace camshaft position sensor (PHASE).

6. CHECK THROTTLE POSITION SENSOR

Refer to [EC-695. "Component Inspection"](#).

DTC P0643 SENSOR POWER SUPPLY

[MR18DE]

< SERVICE INFORMATION >

OK or NG

- OK >> GO TO 8.
- NG >> GO TO 7.

7. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-580, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

8. CHECK APP SENSOR

Refer to [EC-969, "Component Inspection"](#).

OK or NG

- OK >> GO TO 10.
- NG >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-580, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

10. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

DTC P0850 PNP SWITCH

< SERVICE INFORMATION >

[MR18DE]

DTC P0850 PNP SWITCH

Component Description

INFOID:0000000005532766

When the shift lever position is Neutral, park/neutral position (PNP) switch is ON. (M/T)
 When the shift lever position is P or N, transmission range switch is ON. (A/T and CVT)
 ECM detects the position because the continuity of the line (the ON signal) exists.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005532767

Specification data are reference values.

Monitor item	Condition	Specification
P/N POSI SW	• Ignition switch: ON Shift lever: P or N (A/T, CVT), Neutral (M/T)	ON
	Shift lever: Except above	OFF

On Board Diagnosis Logic

INFOID:0000000005532768

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0850 0850	Park/neutral position switch	The park/neutral position (PNP) signal is not changed in the process of engine starting and driving.	<ul style="list-style-type: none"> • Harness or connectors [Park/neutral position (PNP) signal circuit is open or shorted.] • Park/neutral position (PNP) switch (M/T) • Transmission range switch (A/T and CVT)

DTC Confirmation Procedure

INFOID:0000000005532769

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

Ⓟ WITH CONSULT-III

1. Turn ignition switch ON.
2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-III. Then check the "P/N POSI SW" signal under the following conditions.

Position (Shift lever)	Known-good signal
N or P position (A/T, CVT) Neutral position (M/T)	ON
Except above	OFF

If NG, go to [EC-904. "Diagnosis Procedure"](#).

If OK, go to following step.

3. Select "DATA MONITOR" mode with CONSULT-III.
4. Start engine and warm it up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	More than 1,200 rpm (CVT) More than 1,450 rpm (A/T) More than 1,900 rpm (M/T)
COOLAN TEMP/S	More than 70°C (158°F)

DTC P0850 PNP SWITCH

[MR18DE]

< SERVICE INFORMATION >

B/FUEL SCHDL	2.4 - 31.8 msec (CVT) 1.4 - 31.8 msec (A/T) 1.7 - 31.8 msec (M/T)
VHCL SPEED SE	More than 64km/h (29 MPH)
Shift lever	Suitable position

6. Check 1st trip DTC.
7. If 1st trip DTC is detected, go to [EC-904, "Diagnosis Procedure"](#).

Overall Function Check

INFOID:000000005532770

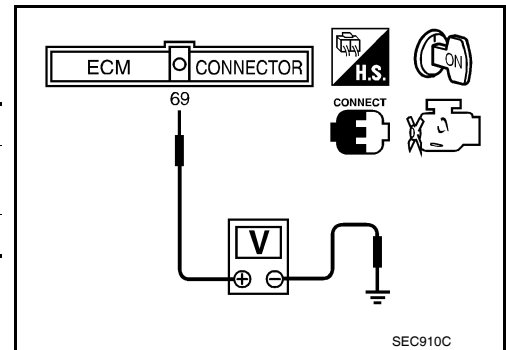
Use this procedure to check the overall function of the park/neutral position (PNP) signal circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 69 (PNP signal) and ground under the following conditions.

Condition (Shift lever)	Voltage (Known-good data)
P or N position (A/T, CVT) Neutral position (M/T)	BATTERY VOLTAGE (11 - 14 V)
Except above	Approx. 0 V

3. If NG, go to [EC-904, "Diagnosis Procedure"](#).



DTC P0850 PNP SWITCH






< SERVICE INFORMATION >

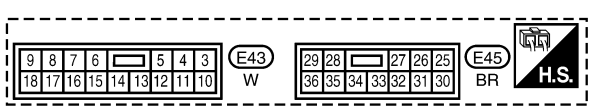
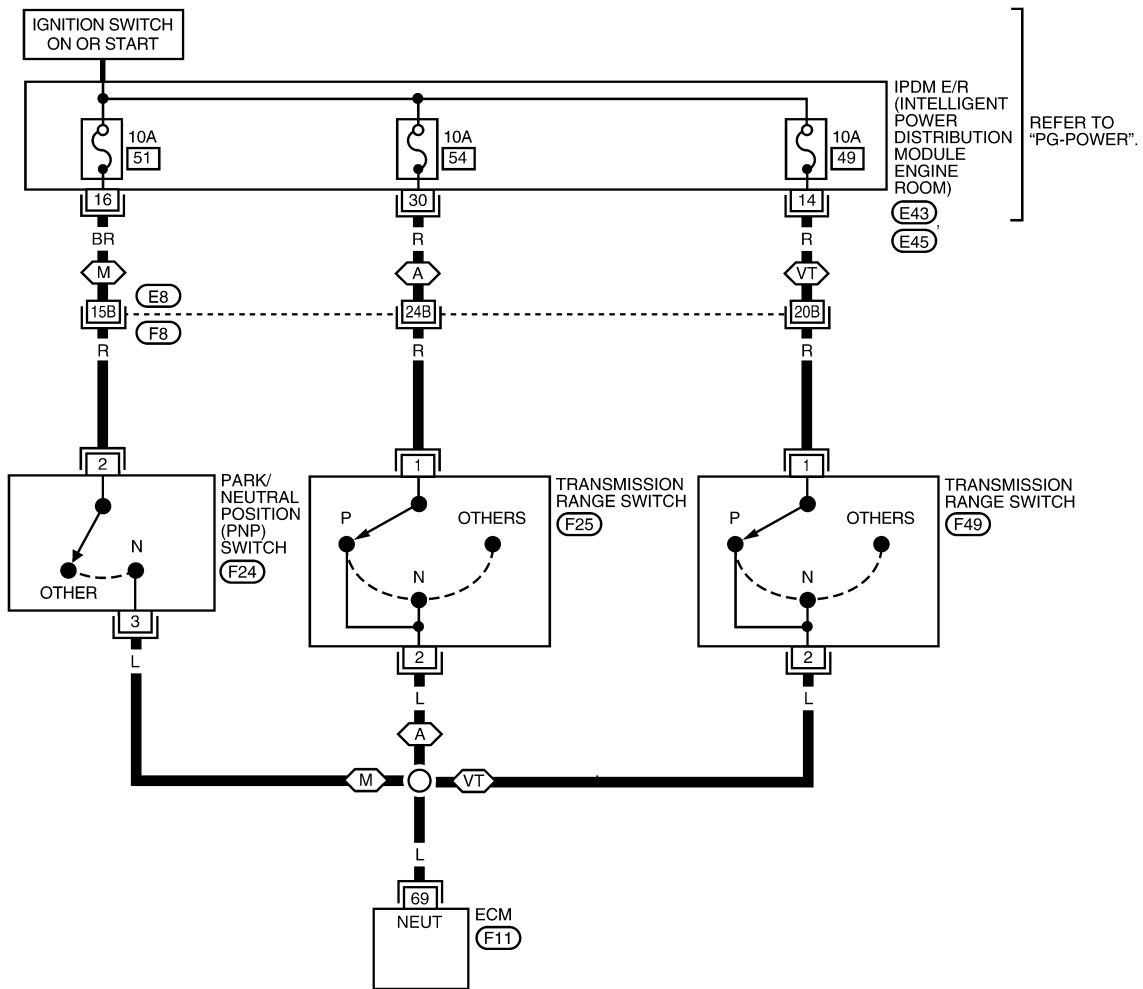
[MR18DE]


Wiring Diagram

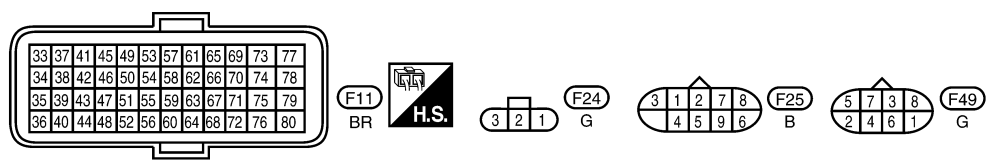
INFOID:000000005532771

EC-PNP/SW-01

-  : DETECTABLE LINE FOR DTC
-  : NON-DETECTABLE LINE FOR DTC
-  : WITH A/T
-  : WITH M/T
-  : WITH CVT



REFER TO THE FOLLOWING.
 - SUPER MULTIPLE JUNCTION (SMJ)



ABBWA0364GB

Specification data are reference values and are measured between each terminal and ground.
CAUTION:
 Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0850 PNP SWITCH

[MR18DE]

< SERVICE INFORMATION >

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
69	L	PNP signal	[Ignition switch: ON] • Shift lever: P or N (A/T, CVT), Neutral (M/T)	BATTERY VOLTAGE (11 - 14 V)
			[Ignition switch: ON] • Except above	Approximately 0 V

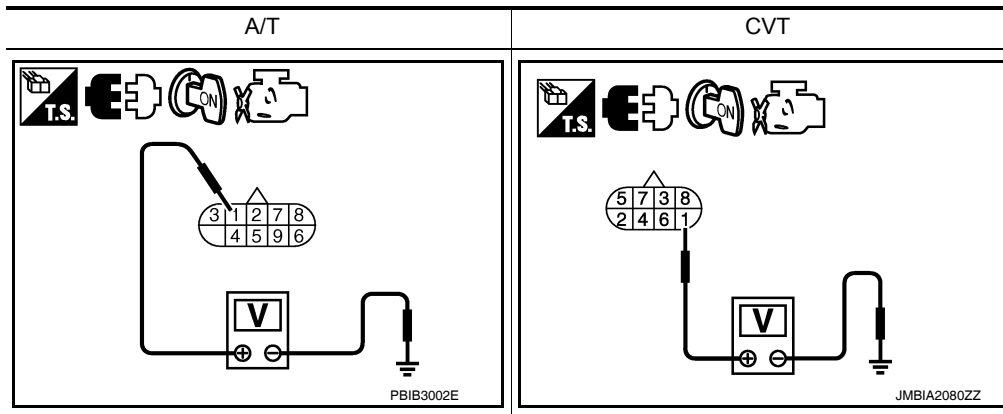
Diagnosis Procedure

INFOID:000000005532772

A/T MODELS AND CVT MODELS

1. CHECK TRANSMISSION RANGE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect transmission range switch harness connector.
3. Turn ignition switch ON.
4. Check voltage between transmission range switch terminal 1 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

- OK >> GO TO 3.
- NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between transmission range switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK PNP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between transmission range switch terminal 2 and ECM terminal 69.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 4.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0850 PNP SWITCH

[MR18DE]

< SERVICE INFORMATION >

4. CHECK TRANSMISSION RANGE SWITCH

Refer to [AT-94. "Component Inspection"](#) (A/T), [CVT-65. "Component Inspection"](#) (CVT).

OK or NG

- OK >> GO TO 5.
- NG >> Replace transmission range switch.

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

M/T MODELS

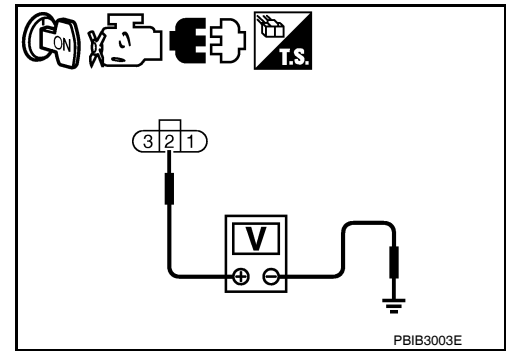
1. CHECK PNP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect PNP switch harness connector.
3. Turn ignition switch ON.
4. Check voltage between PNP switch terminal 2 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 3.
- NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between PNP switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK PNP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between PNP switch terminal 3 and ECM terminal 69.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 4.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK PNP SWITCH

Refer to [MT-57](#).

OK or NG

- OK >> GO TO 5.
- NG >> Replace PNP switch.

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

DTC P0850 PNP SWITCH

< SERVICE INFORMATION >

[MR18DE]

>> INSPECTION END

DTC P1148 CLOSED LOOP CONTROL

< SERVICE INFORMATION >

[MR18DE]

DTC P1148 CLOSED LOOP CONTROL

On Board Diagnosis Logic

INFOID:000000005532773

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1148 1148	Closed loop control function	The closed loop control function does not operate even when vehicle is driving in the specified condition.	<ul style="list-style-type: none">• Harness or connectors [Air fuel ratio (A/F) sensor 1 circuit is open or shorted.]• Air fuel ratio (A/F) sensor 1• Air fuel ratio (A/F) sensor 1 heater

NOTE:

DTC P1148 is displayed with another DTC for air fuel ratio (A/F) sensor 1. Perform the trouble diagnosis for the corresponding DTC.

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

DTC P1211 TCS CONTROL UNIT

< SERVICE INFORMATION >

[MR18DE]

DTC P1211 TCS CONTROL UNIT

Description

INFOID:000000005549971

The malfunction information related to TCS is transferred via the CAN communication line from “ABS actuator and electric unit (control unit)” to ECM.

Always erase the malfunction information such as DTC not only for “ABS actuator and electric unit (control unit)” but also for ECM after TCS related repair.

On Board Diagnosis Logic

INFOID:000000005549972

**Freeze frame data is not stored in the ECM for this self-diagnosis.
The MIL will not illuminate for this self-diagnosis.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1211 1211	TCS control unit	ECM receives a malfunction information from “ABS actuator electric unit (control unit)”	<ul style="list-style-type: none">• ABS actuator and electric unit (control unit)• TCS related parts

DTC Confirmation Procedure

INFOID:000000005549973

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

1. Start engine and let it idle for at least 60 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-908. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005549974

Go to [BRC-60. "CONSULT-III Function \(ABS\)"](#).

DTC P1212 TCS COMMUNICATION LINE

< SERVICE INFORMATION >

[MR18DE]

DTC P1212 TCS COMMUNICATION LINE

Description

INFOID:000000005549975

NOTE:

- If DTC P1212 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1212 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to [EC-895](#).

The CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and “ABS actuator and electric unit (control unit)”.

Always erase the malfunction information such as DTC not only for “ABS actuator and electric unit (control unit)” but also for ECM after TCS related repair.

On Board Diagnosis Logic

INFOID:000000005549976

**Freeze frame data is not stored in the ECM for this self-diagnosis.
The MIL will not illuminate for this self-diagnosis.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1212 1212	TCS communication line	ECM cannot receive the information from “ABS actuator and electric unit (control unit)” continuously.	<ul style="list-style-type: none">• Harness or connectors (The CAN communication line is open or shorted.)• ABS actuator and electric unit (control unit)• Dead (Weak) battery

DTC Confirmation Procedure

INFOID:000000005549977

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-909, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005549978

Go to [BRC-60, "CONSULT-III Function \(ABS\)"](#).

DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

[MR18DE]

DTC P1217 ENGINE OVER TEMPERATURE

System Description

INFOID:000000005532774

SYSTEM DESCRIPTION

NOTE:

- If DTC P1217 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1217 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to [EC-895](#).

Cooling Fan Control

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	Cooling fan control	IPDM E/R (Cooling fan relays)
Battery	Battery voltage*1		
ABS actuator and electric unit (control unit)	Vehicle speed*2		
Combination meter			
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner ON signal*2		
Refrigerant pressure sensor	Refrigerant pressure		

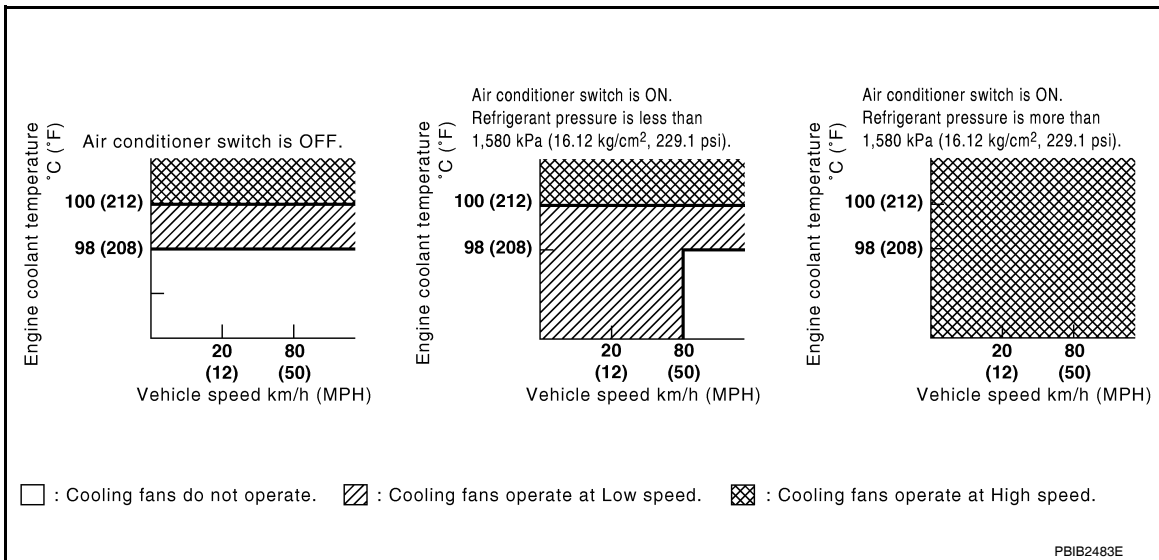
*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to ECM through CAN communication line.

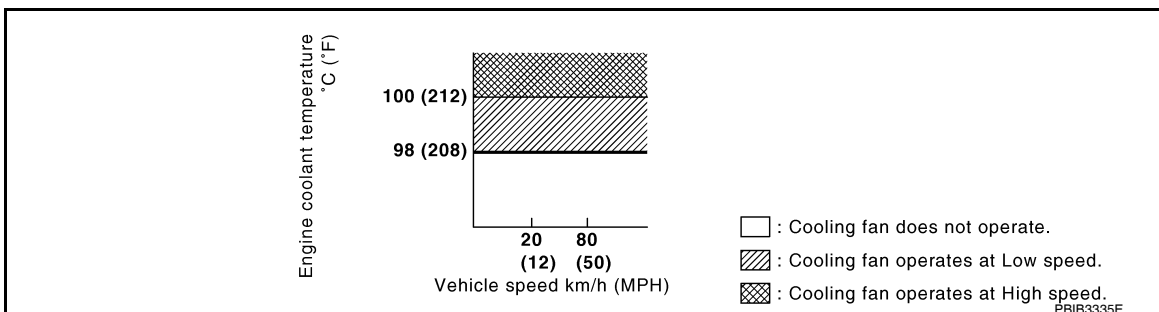
The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

Cooling Fan Operation

Models with A/C



Models without A/C



DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

[MR18DE]

Cooling Fan Relay Operation

The ECM controls cooling fan relays in the IPDM E/R through CAN communication line.

Cooling fan speed	Cooling fan relay		
	1	2	3
Stop (OFF)	OFF	OFF	OFF
Low (LOW)	ON	OFF	OFF
High (HI)	ON	ON	ON

CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532776

Specification data are reference values.

Monitor item	Condition	Specification
AIR COND SIG	• Engine: After warming up, idle the engine Air conditioner switch: OFF	OFF
	Air conditioner switch: ON (Compressor operates.)	ON
COOLING FAN	• Engine: After warming up, idle the engine • Air conditioner switch: OFF Engine coolant temperature: 97°C (207°F) or less	OFF
	Engine coolant temperature: Between 98°C (208°F) and 99°C (210°F)	LOW
	Engine coolant temperature: 100°C (212°F) or more	HIGH

On Board Diagnosis Logic

INFOID:000000005532776

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise. When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217 1217	Engine over temperature (Overheat)	<ul style="list-style-type: none"> Cooling fan does not operate properly (Overheat). Cooling fan system does not operate properly (Overheat). Engine coolant was not added to the system using the proper filling method. Engine coolant is not within the specified range. 	<ul style="list-style-type: none"> Harness or connectors (Cooling fan circuit is open or shorted.) Cooling fan IPDM E/R (Cooling fan relays) Radiator hose Radiator Reservoir tank Radiator cap Water pump Thermostat Water control valve <p>For more information, refer to EC-917, "Main 13 Causes of Overheating".</p>

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to [CO-36, "Changing Engine Coolant"](#). Also, replace the engine oil. Refer to [LU-18, "Changing Engine Oil"](#).

- Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to [MA-15, "Anti-freeze Coolant Mixture Ratio"](#).
- After refilling coolant, run engine to ensure that no water-flow noise is emitted.

Overall Function Check

INFOID:000000005532777

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

DTC P1217 ENGINE OVER TEMPERATURE

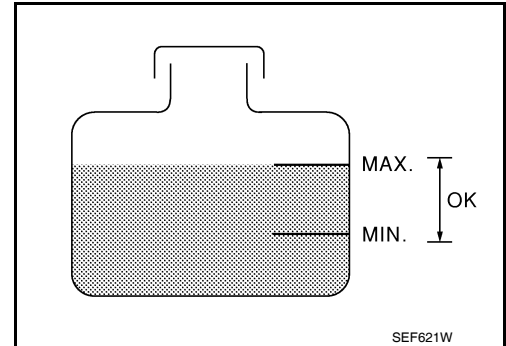
[MR18DE]

< SERVICE INFORMATION >

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the reservoir tank or the radiator.
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

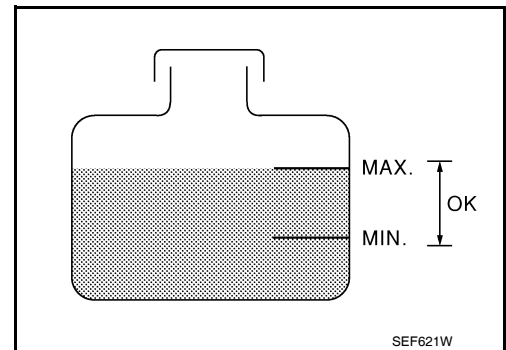
④ WITH CONSULT-III

1. Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to [EC-914, "Diagnosis Procedure"](#) or [EC-914, "Diagnosis Procedure"](#).
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-914, "Diagnosis Procedure"](#) or [EC-914, "Diagnosis Procedure"](#).
3. Turn ignition switch ON.
4. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-III.
5. If the results are NG, go to [EC-914, "Diagnosis Procedure"](#) or [EC-914, "Diagnosis Procedure"](#).



④ WITH GST

1. Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to [EC-914, "Diagnosis Procedure"](#).
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-914, "Diagnosis Procedure"](#).
3. Perform IPDM/ER auto active test and check cooling fan motor operation. Refer to [PG-20, "Auto Active Test"](#).
4. If NG, go to [EC-914, "Diagnosis Procedure"](#).



DTC P1217 ENGINE OVER TEMPERATURE




< SERVICE INFORMATION >

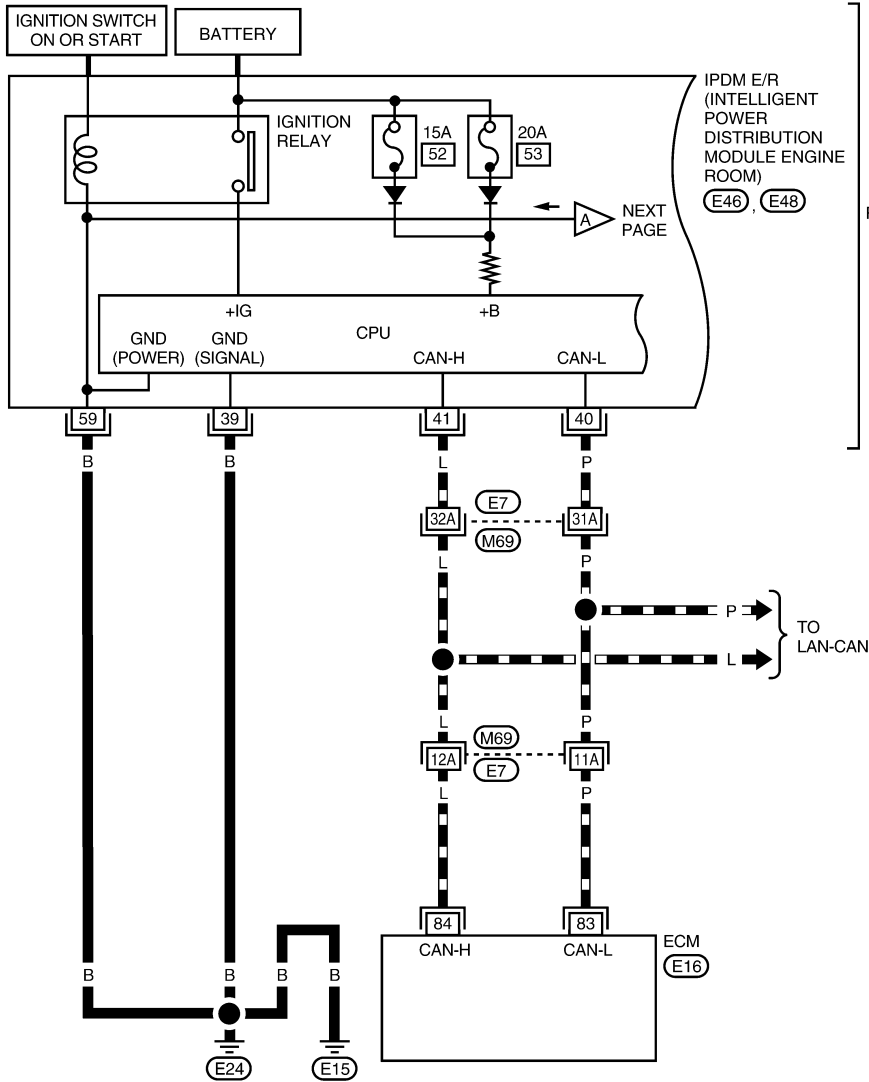
[MR18DE]

INFOID:000000005532778

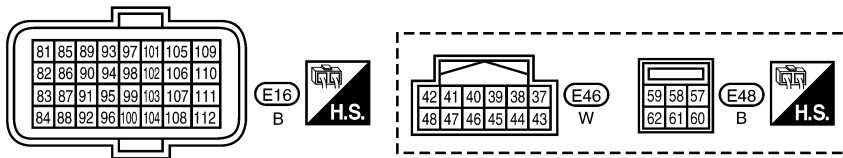
Wiring Diagram


EC-COOL/F-01

-  : DETECTABLE LINE FOR DTC
-  : NON-DETECTABLE LINE FOR DTC
-  : DATA LINE



REFER TO "PG-POWER".



REFER TO THE FOLLOWING.
 - SUPER MULTIPLE JUNCTION (SMJ)

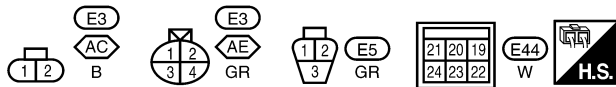
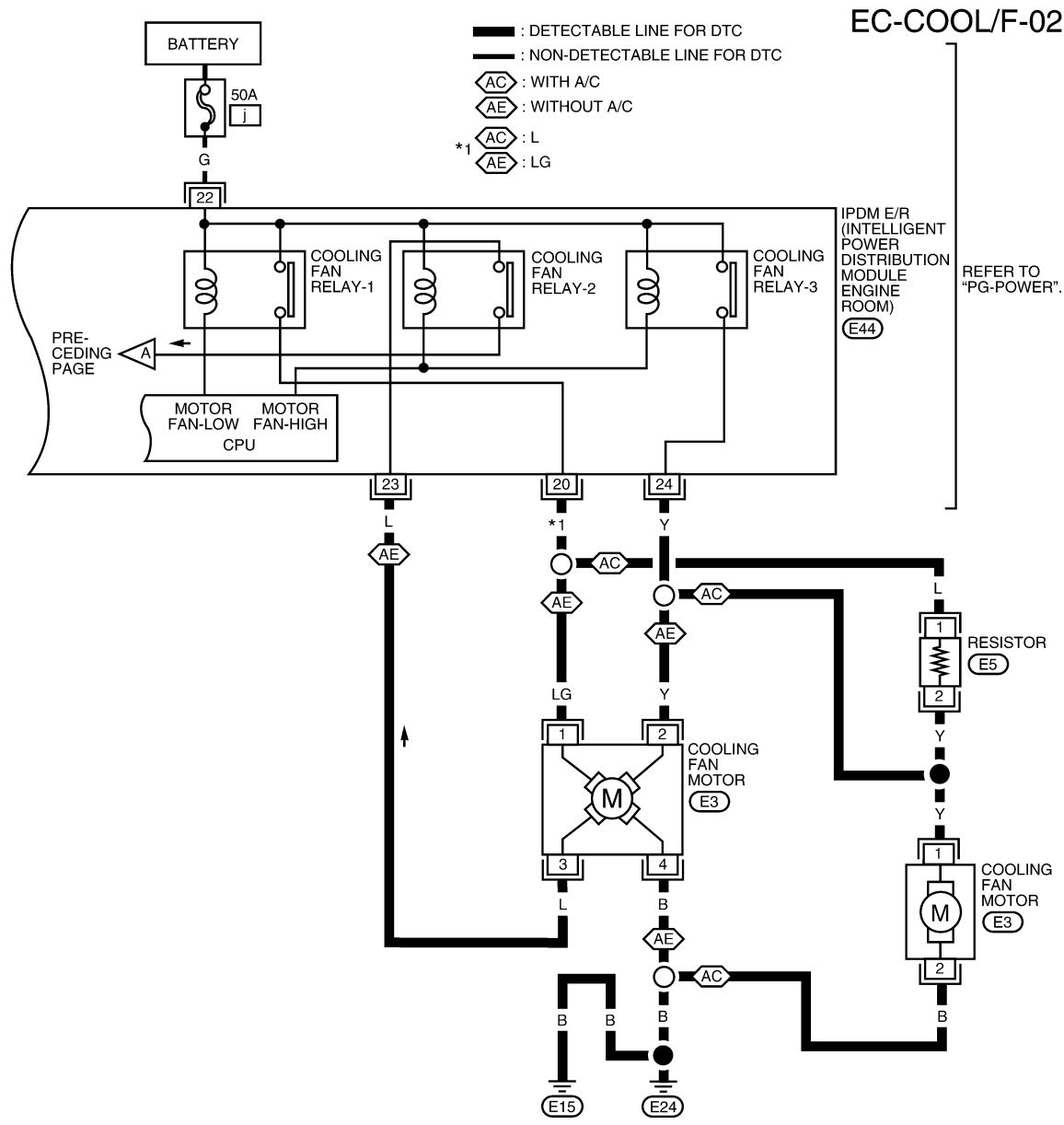
BBWA2997E

A
 EC
 C
 D
 E
 F
 G
 H
 I
 J
 K
 L
 M
 N
 O
 P

DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

[MR18DE]



BBWA3001E

INFOID:000000005532779

Diagnosis Procedure

1. INSPECTION START

Do you have CONSULT-III?

Yes or No

- Yes >> GO TO 2.
- No >> GO TO 3.

DTC P1217 ENGINE OVER TEMPERATURE

[MR18DE]

< SERVICE INFORMATION >

2. CHECK COOLING FAN OPERATION

With CONSULT-III

1. Turn ignition switch ON.
2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-III.
3. Make sure that cooling fan operates at each speed.

OK or NG

- OK >> GO TO 4.
NG >> GO TO 8.

3. CHECK COOLING FAN OPERATION

Without CONSULT-III

1. Perform IPDM E/R auto active test and check cooling fan operation.
Refer to [PG-20, "Auto Active Test"](#).
2. Make sure that cooling fan operates at each speed.

OK or NG

- OK >> GO TO 4.
NG >> GO TO 8.

4. CHECK COOLING SYSTEM FOR LEAK

Refer to [CO-36, "Inspection"](#).

OK or NG

- OK >> GO TO 5.
NG >> Check the following for leak. Refer to [CO-36, "Inspection"](#).
- Hose
 - Radiator
 - Water pump

5. CHECK RADIATOR CAP

Refer to [CO-39, "Checking Radiator Cap"](#).

OK or NG

- OK >> GO TO 6.
NG >> Replace radiator cap.

6. CHECK COMPONENT PARTS

Check the following.

- Thermostat. (Refer to [CO-46](#).)
- Water control valve. (Refer to [CO-48](#).)
- Engine coolant temperature sensor. (Refer to [EC-684](#).)

OK or NG

- OK >> GO TO 7.
NG >> Replace malfunctioning component.

7. CHECK MAIN 13 CAUSES

If the cause cannot be isolated, go to [EC-917, "Main 13 Causes of Overheating"](#).

>> **INSPECTION END**

8. CHECK IPDM E/R POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E44.

DTC P1217 ENGINE OVER TEMPERATURE

[MR18DE]

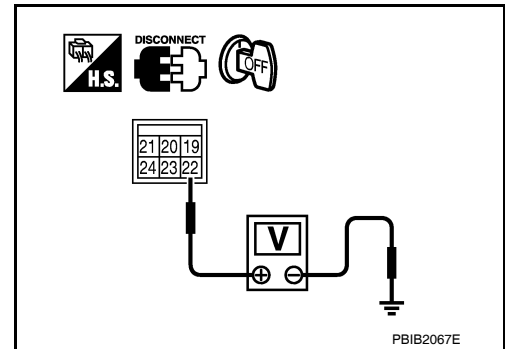
< SERVICE INFORMATION >

3. Check voltage between IPDM E/R terminal 22 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 10.
NG >> GO TO 9.



9. DETECT MALFUNCTIONING PART

Check the following.

- 50 A fusible link
- Harness for open or short between IPDM E/R and battery

>> Repair open circuit or short to ground in harness or connectors.

10. CHECK IPDM E/R GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connectors E46 and E48.
3. Check harness continuity between IPDM E/R terminals 59, 39 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

- OK (Models with A/C) >> GO TO 11.
OK (Models without A/C) >> GO TO 13.
NG >> Repair open circuit or short to power in harness or connectors.

11. CHECK COOLING FAN MOTOR CIRCUIT

1. Disconnect cooling fan motor harness connector.
2. Check harness continuity between the followings;
Cooling fan motor terminal 1 and IPDM E/R terminals 20, 24.
Cooling fan motor terminal 2 and ground.
Refer to wiring diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 15.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground
- Resistor E5

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK COOLING FAN MOTOR CIRCUIT

1. Disconnect cooling fan motor harness connector.
2. Check harness continuity between the followings;
Cooling fan motor terminal 1 and IPDM E/R terminal 20.

DTC P1217 ENGINE OVER TEMPERATURE

[MR18DE]

< SERVICE INFORMATION >

Cooling fan motor terminal 2 and IPDM E/R terminal 24.
Cooling fan motor terminal 3 and IPDM E/R terminal 23.
Cooling fan motor terminal 4 and ground.
Refer to wiring diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground

>> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK COOLING FAN MOTOR

Refer to [EC-918. "Component Inspection"](#).

OK or NG

OK >> GO TO 16.
NG >> Replace cooling fan motor.

16. CHECK INTERMITTENT INCIDENT

Perform [EC-632](#).

OK or NG

OK >> Replace IPDM E/R. Refer to [PG-28. "Removal and Installation of IPDM E/R"](#).
NG >> Repair or replace harness or connector.

Main 13 Causes of Overheating

INFOID:000000005532780

Engine	Step	Inspection item	Equipment	Standard	Reference
OFF	1	<ul style="list-style-type: none"> • Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper 	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	See MA-15. "Anti-freeze Coolant Mixture Ratio" .	
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See CO-36. "Inspection" .
	4	• Radiator cap	• Pressure tester	See CO-39. "Checking Radiator Cap" .	
ON*2	5	• Coolant leaks	• Visual	No leaks	See CO-36. "Inspection" .
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-46 , and CO-48
ON*1	7	• Cooling fan	• CONSULT-III	Operating	See trouble diagnosis for DTC P1217 (EC-914. "Diagnosis Procedure").
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	See CO-36. "Changing Engine Coolant" .

DTC P1217 ENGINE OVER TEMPERATURE

[MR18DE]

< SERVICE INFORMATION >

Engine	Step	Inspection item	Equipment	Standard	Reference
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See CO-36, "Inspection" .
OFF	11	• Water control valve	• Remove and inspect the valve	Within the specified value	See CO-48, "Removal and Installation"
OFF	12	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-181 .
	13	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See EM-195 .

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to [CO-33](#).

Component Inspection

INFOID:000000005532781

COOLING FAN MOTOR

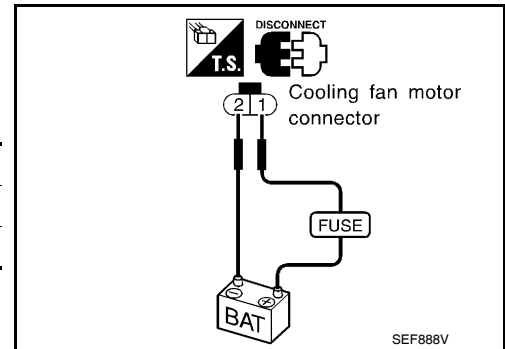
Model with A/C

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

Cooling fan motor	Terminals	
	(+)	(-)
	1	2

Cooling fan motor should operate.

If NG, replace cooling fan motor.



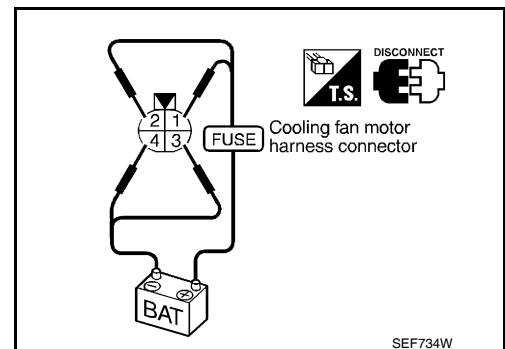
Models without A/C

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

Cooling fan motor	Speed	terminals	
		(+)	(-)
Low		1	4
		2	3
High		1 and 2	3 and 4

Cooling fan motor should operate.

If NG, replace cooling fan motor.



DTC P1225 TP SENSOR

< SERVICE INFORMATION >

[MR18DE]

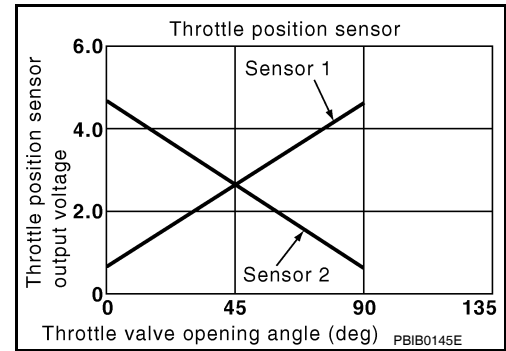
DTC P1225 TP SENSOR

Component Description

INFOID:000000005532782

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



On Board Diagnosis Logic

INFOID:000000005532783

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225 1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC Confirmation Procedure

INFOID:000000005532784

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to [EC-919, "Diagnosis Procedure"](#).

Diagnosis Procedure

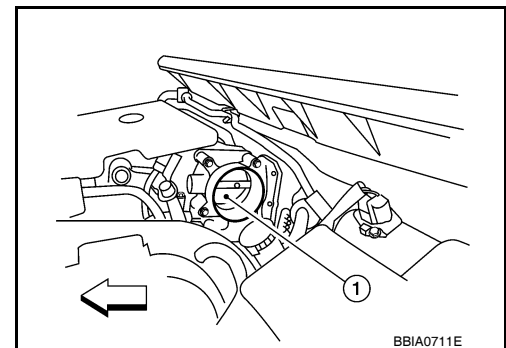
INFOID:000000005532785

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve (1) and the housing.
 - ⇐: Vehicle front

OK or NG

- OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-580, "Idle Air Volume Learning"](#).

DTC P1225 TP SENSOR

< SERVICE INFORMATION >

[MR18DE]

>> **INSPECTION END**

Removal and Installation

INFOID:000000005532786

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-137](#).

DTC P1226 TP SENSOR

< SERVICE INFORMATION >

[MR18DE]

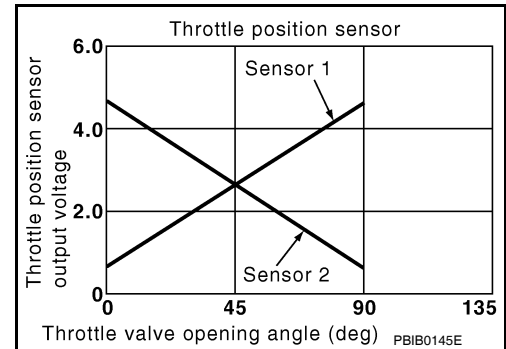
DTC P1226 TP SENSOR

Component Description

INFOID:000000005532787

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



On Board Diagnosis Logic

INFOID:000000005532788

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226 1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC Confirmation Procedure

INFOID:000000005532789

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 3 and 4 for 32 times.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-921. "Diagnosis Procedure"](#).

Diagnosis Procedure

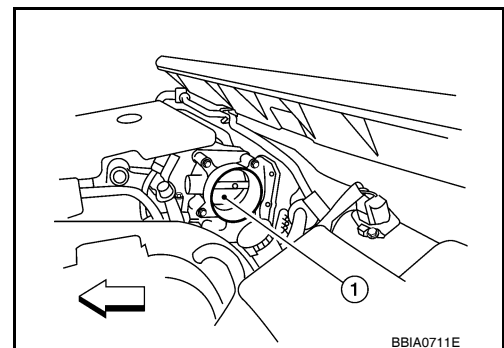
INFOID:000000005532790

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve (1) and the housing.
 - ⇐: Vehicle front

OK or NG

- OK >> GO TO 2.
- NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-580. "Throttle Valve Closed Position Learning"](#).

DTC P1226 TP SENSOR

< SERVICE INFORMATION >

[MR18DE]

3. Perform [EC-580, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

Removal and Installation

INFOID:000000005532791

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-137](#).

DTC P1421 COLD START CONTROL

< SERVICE INFORMATION >

[MR18DE]

DTC P1421 COLD START CONTROL

Description

INFOID:000000005532792

ECM controls ignition timing and engine idle speed when engine is started with prewarming up condition. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

On Board Diagnosis Logic

INFOID:000000005532793

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1421 1421	Cold start emission reduction strategy monitoring	ECM does not control ignition timing and engine idle speed properly when engine is started with prewarming up condition.	<ul style="list-style-type: none">Lack of intake air volumeFuel injection systemECM

DTC Confirmation Procedure

INFOID:000000005532794

NOTE:

- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- If DTC P1421 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

Ⓟ WITH CONSULT-III

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-III.
- Check that the "COOLAN TEMP/S" indication is between 4°C (39°F) and 36°C (97°F).
If "COOLAN TEMP/S" indication is within the specified value, go to the following step.
If "COOLAN TEMP/S" indication is out of the specified value, cool engine down or warm engine up and go to step 1.
- Start engine and let it idle for 5 minutes.
- Check 1st trip DTC.
- If 1st trip DTC is detected, go to [EC-923, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005532795

1.PERFORM IDLE AIR VOLUME LEARNING

Perform [EC-580, "Idle Air Volume Learning"](#).

Is Idle Air Volume Learning carried out successfully?

Yes or No

Yes >> GO TO 2.

No >> Follow the instruction of Idle Air Volume Learning.

2.CHECK INTAKE SYSTEM

Check for the cause of intake air volume lacking. Refer to the following.

- Crushed intake air passage
- Intake air passage clogging

OK or NG

OK >> GO TO 3.

NG >> Repair or replace malfunctioning part

3.CHECK FUEL INJECTION SYSTEM FUNCTION

Perform [EC-758, "DTC Confirmation Procedure"](#) for DTC P0171.

OK or NG

OK >> GO TO 4.

DTC P1421 COLD START CONTROL

[MR18DE]

< SERVICE INFORMATION >

NG >> Go to [EC-761, "Diagnosis Procedure"](#) for DTC P0171.

4. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. **Perform DTC Confirmation Procedure.**
See [EC-923, "DTC Confirmation Procedure"](#).
3. Is the 1st trip DTC P1421 displayed again?

Yes or No

- Yes >> GO TO 5.
No >> **INSPECTION END**

5. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs.
Refer to [BL-249, "ECM Re-communicating Function"](#).
3. Perform [EC-580, "VIN Registration"](#).
4. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).
5. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
6. Perform [EC-580, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

DTC P1564 ASCD STEERING SWITCH

< SERVICE INFORMATION >

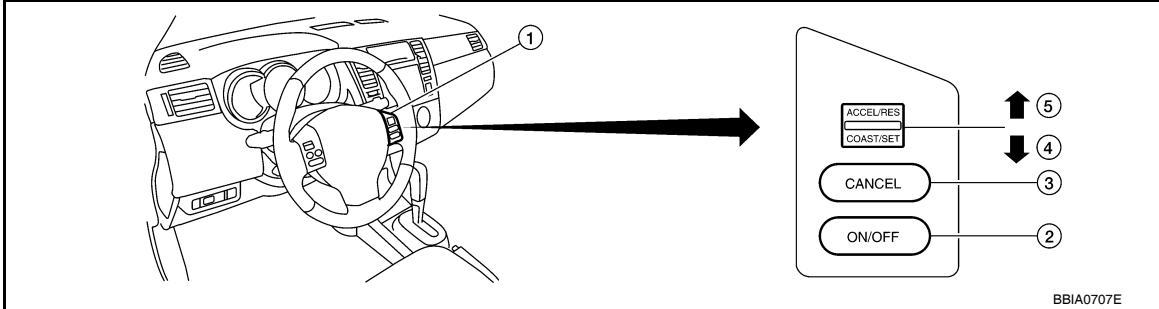
[MR18DE]

DTC P1564 ASCD STEERING SWITCH

Component Description

INFOID:000000005532796

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.



- 1. ASCD steering switch
- 2. MAIN switch
- 3. CANCEL switch
- 4. RESUME/ACCELERATE switch
- 5. SET/COAST switch

Refer to [EC-522](#) for the ASCD function.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532797

Specification data are reference values.

Monitor item	Condition	Specification	
MAIN SW	• Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	• Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	• Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	• Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF

On Board Diagnosis Logic

INFOID:000000005532798

This self-diagnosis has the one trip detection logic.

The MIL will not light up for this diagnosis.

NOTE:

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605.

Refer to [EC-893](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1564 1564	ASCD steering switch	<ul style="list-style-type: none"> • An excessively high voltage signal from the ASCD steering switch is sent to ECM. • ECM detects that input signal from the ASCD steering switch is out of the specified range. • ECM detects that the ASCD steering switch is stuck ON. 	<ul style="list-style-type: none"> • Harness or connectors (ASCD switch circuit is open or shorted.) • ASCD steering switch • ECM

DTC P1564 ASCD STEERING SWITCH

< SERVICE INFORMATION >

[MR18DE]

DTC Confirmation Procedure

INFOID:000000005532799

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch ON and wait at least 10 seconds.
2. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
3. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Check DTC.
7. If DTC is detected, go to [EC-928, "Diagnosis Procedure"](#).

DTC P1564 ASCD STEERING SWITCH

< SERVICE INFORMATION >

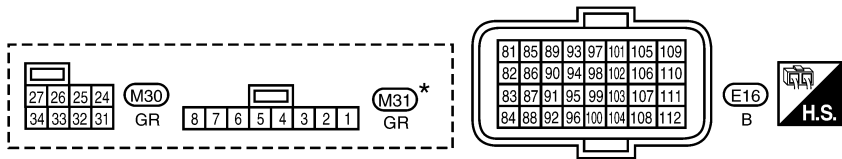
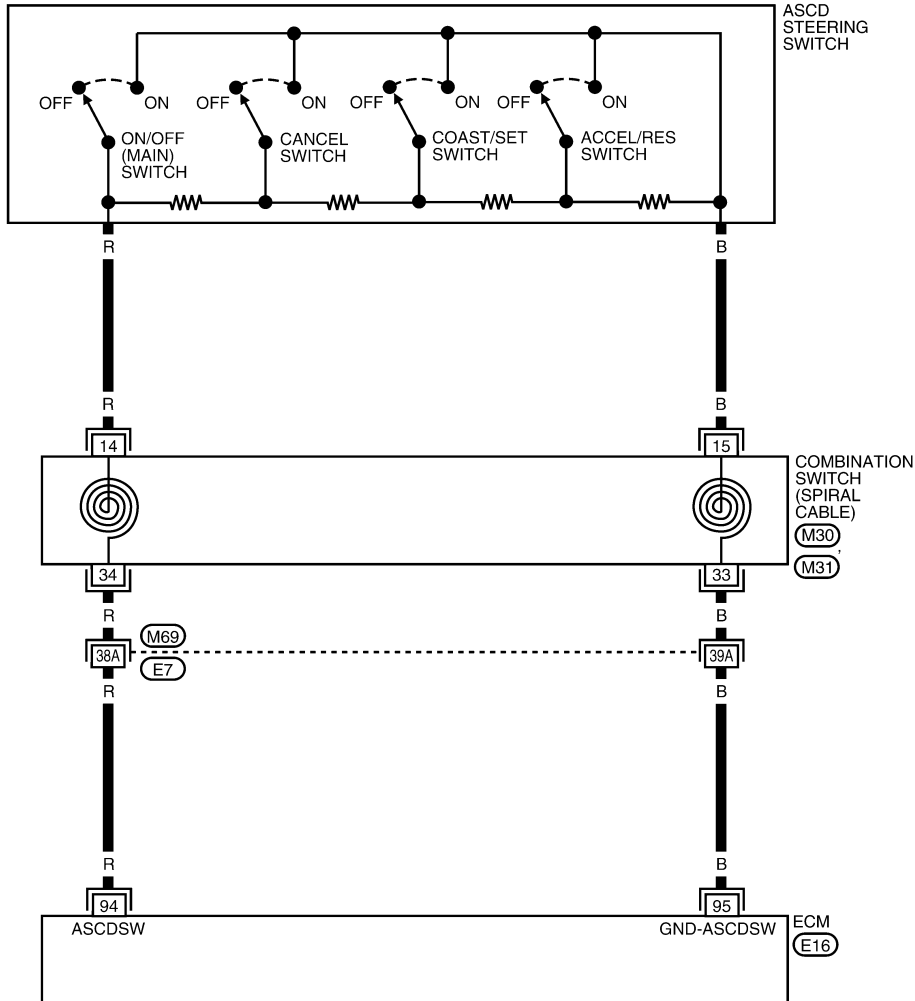
[MR18DE]

Wiring Diagram

INFOID:000000005532800

EC-ASC/SW-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
 (M69) - SUPER MULTIPLE JUNCTION (SMJ)

* : THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION.

ABBWA0362GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1564 ASCD STEERING SWITCH

< SERVICE INFORMATION >

[MR18DE]

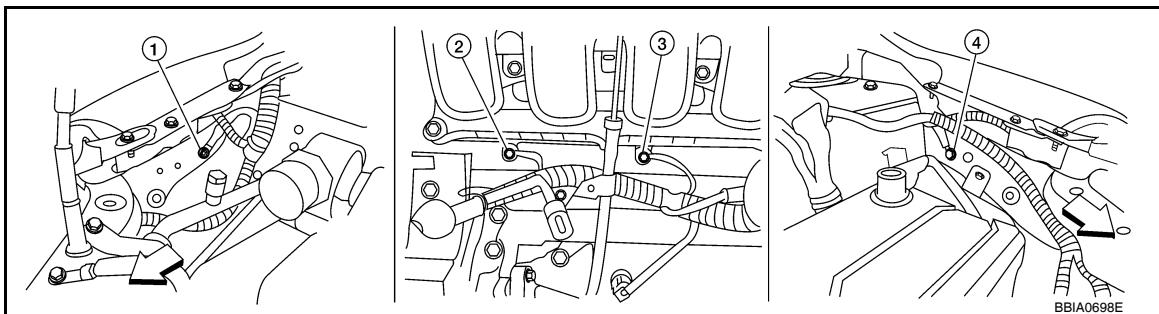
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
94	R	ASCD steering switch	[Ignition switch: ON] • ASCD steering switch: OFF	Approximately 4 V
			[Ignition switch: ON] • MAIN switch: Pressed	Approximately 0 V
			[Ignition switch: ON] • CANCEL switch: Pressed	Approximately 1 V
			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	Approximately 3 V
			[Ignition switch: ON] • SET/COAST switch: Pressed	Approximately 2 V
95	B	Sensor ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V

Diagnosis Procedure

INFOID:000000005532801

1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten ground screw on the body.
Refer to [EC-638, "Ground Inspection"](#).



↔ Vehicle front

- Body ground E24
- Engine ground F9
- Engine ground F16
- Body ground E15

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-III

- Turn ignition switch ON.
- Select "MAIN SW", "RESUME/ACC SW", "SET SW and "CANCEL SW" in "DATA MONITOR" mode with CONSULT-III.
- Check each item indication under the following conditions.

Switch	Monitor item	Condition	Indication
MAIN switch	MAIN SW	Pressed	ON
		Released	OFF
CANCEL switch	CANCEL SW	Pressed	ON
		Released	OFF

DTC P1564 ASCD STEERING SWITCH

[MR18DE]

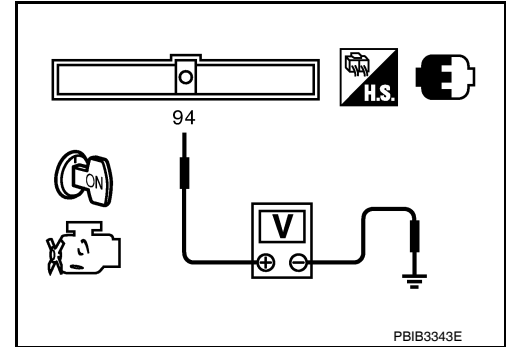
< SERVICE INFORMATION >

Switch	Monitor item	Condition	Indication
RESUME/ACCELERATE switch	RESUME/ACC SW	Pressed	ON
		Released	OFF
SET/COAST switch	SET SW	Pressed	ON
		Released	OFF

⊗ Without CONSULT-III

- Turn ignition switch ON.
- Check voltage between ECM terminal 94 and ground with pressing each button.

Switch	Condition	Voltage (V)
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4.0
CANCEL switch	Pressed	Approx. 1.0
	Released	Approx. 4.0
RESUME/ACCELERATE switch	Pressed	Approx. 3.0
	Released	Approx. 4.0
SET/COAST switch	Pressed	Approx. 2.0
	Released	Approx. 4.0



OK or NG

- OK >> GO TO 8.
 NG >> GO TO 3.

3. CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect combination switch harness connector M31.
- Disconnect ECM harness connector.
- Check harness continuity between combination switch terminal 15 and ECM terminal 95. Refer to Wiring Diagram.

Continuity should exist.

- Also check harness for short to ground or short to power.

OK or NG

- OK >> GO TO 5.
 NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M69, E7
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Check harness continuity between ECM terminal 94 and combination switch terminal 14. Refer to Wiring Diagram.

Continuity should exist.

- Also check harness for short to ground and short to power.

OK or NG

DTC P1564 ASCD STEERING SWITCH

[MR18DE]

< SERVICE INFORMATION >

- OK >> GO TO 7.
- NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M69, E7
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD STEERING SWITCH

Refer to [EC-930, "Component Inspection"](#).

OK or NG

- OK >> GO TO 8.
- NG >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

Component Inspection

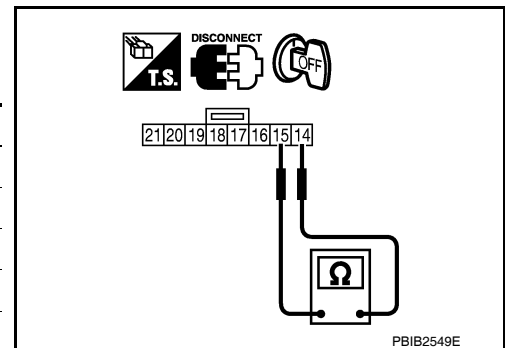
INFOID:000000005532802

ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector M31.
2. Check continuity between combination switch (spiral cable) terminals 14 and 15 with pushing each switch.

Switch	Condition	Resistance (Ω)
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4,000
CANCEL switch	Pressed	Approx. 250
	Released	Approx. 4,000
RESUME/ACCELERATE switch	Pressed	Approx. 1,480
	Released	Approx. 4,000
SET/COAST switch	Pressed	Approx. 660
	Released	Approx. 4,000

If NG, replace ASCD steering switch.



DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

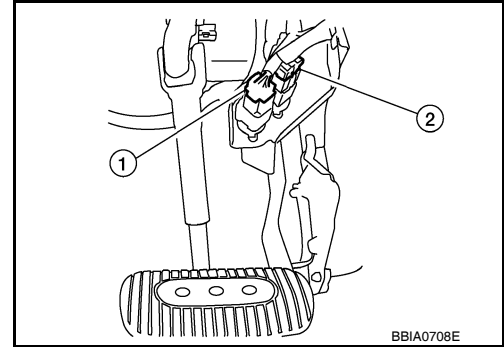
[MR18DE]

DTC P1572 ASCD BRAKE SWITCH

Component Description

INFOID:000000005532803

When the brake pedal is depressed, ASCD brake switch (2) is turned OFF and stop lamp switch (1) is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to [EC-522](#) for the ASCD function.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532804

Specification data are reference values.

Monitor item	Condition	Specification
BRAKE SW1 (ASCD brake switch)	• Ignition switch: ON	• Brake pedal: Fully released (A/T, CVT) • Brake pedal and clutch pedal: Fully released (M/T)
		• Brake pedal: Slightly depressed (A/T, CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)
BRAKE SW2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released
		Brake pedal: Slightly depressed

On Board Diagnosis Logic

INFOID:000000005532805

This self-diagnosis has the one trip detection logic.
The MIL will not light up for this diagnosis.

NOTE:

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-893](#).
- This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1572 1572	ASCD brake switch	A) When the vehicle speed is above 30km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to ECM at the same time.	<ul style="list-style-type: none"> • Harness or connectors (Stop lamp switch circuit is shorted.) • Harness or connectors (ASCD brake switch circuit is shorted.)
		B) ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving	<ul style="list-style-type: none"> • Harness or connectors (ASCD clutch switch circuit is shorted.) (M/T) • Stop lamp switch • ASCD brake switch • ASCD clutch switch (M/T) • Incorrect stop lamp switch installation • Incorrect ASCD brake switch installation • Incorrect ASCD clutch switch installation (M/T) • ECM

DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[MR18DE]

DTC Confirmation Procedure

INFOID:000000005532806

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

TESTING CONDITION:

Steps 3 and 6 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Ⓟ WITH CONSULT-III

1. Start engine.
2. Press MAIN switch and make sure that CRUISE indicator lights up.
3. Drive the vehicle for at least 5 consecutive seconds under the following condition.

Vehicle speed	More than 30 km/h (19 MPH)
Shift lever	Suitable position

4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to [EC-934, "Diagnosis Procedure"](#).
If 1st trip DTC is not detected, go to the following step.
6. Drive the vehicle for at least 5 consecutive seconds under the following condition.

Vehicle speed	More than 30 km/h (19 MPH)
Shift lever	Suitable position
Driving location	Depress the brake pedal for more than 5 seconds so as not to come off from the above-mentioned vehicle speed.

7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to [EC-934, "Diagnosis Procedure"](#).

Ⓟ WITH GST

Follow the procedure "WITH CONSULT-III" above.

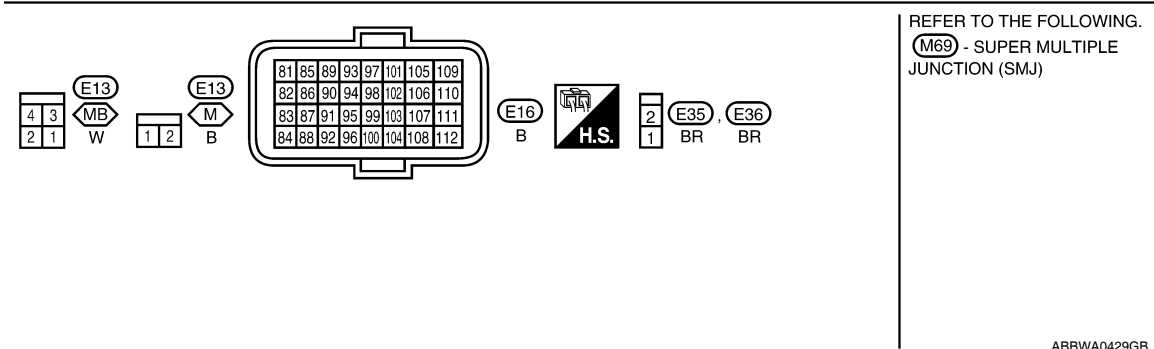
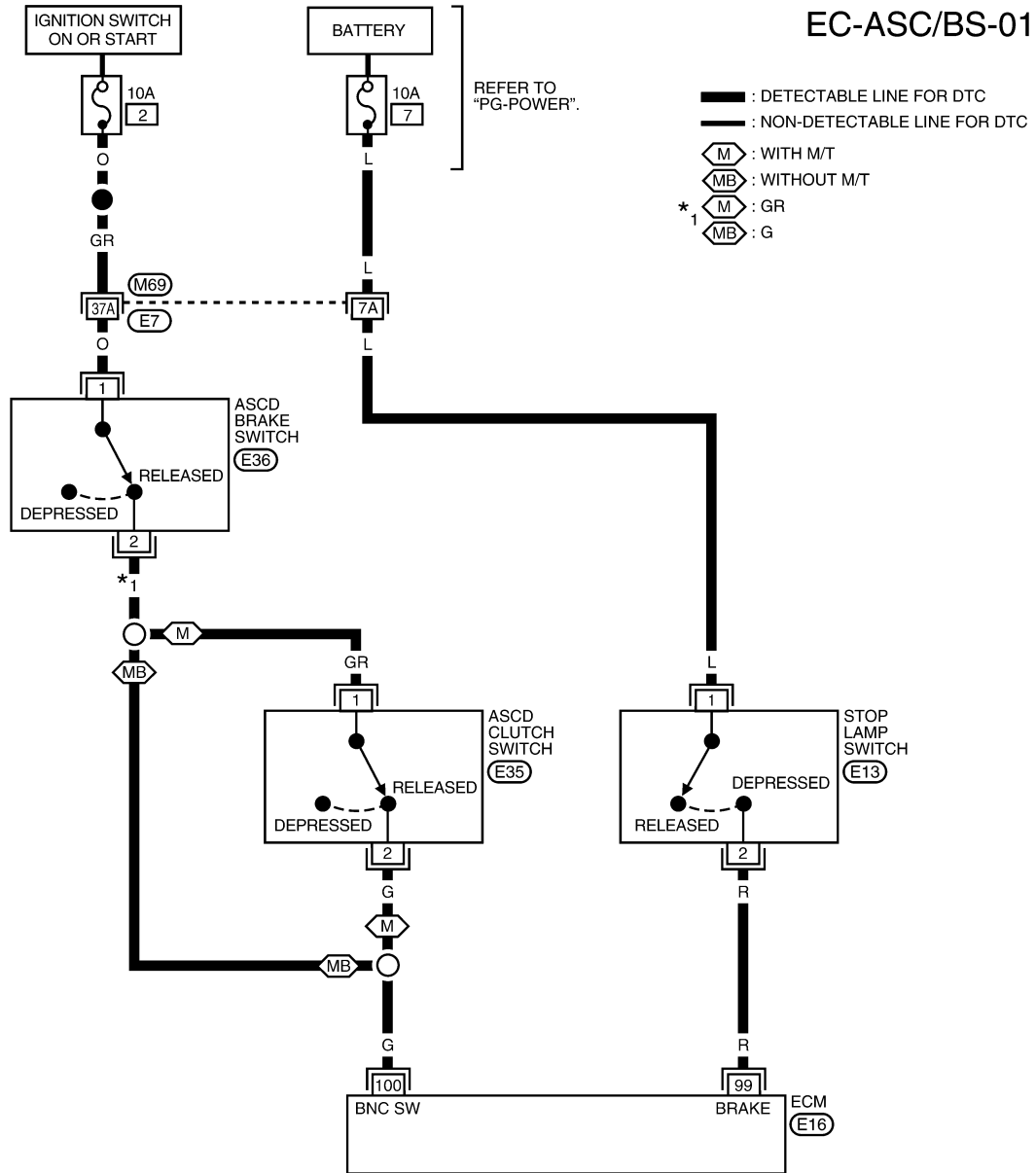
DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[MR18DE]

INFOID:000000005532807

Wiring Diagram



ABBWA0429GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[MR18DE]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
99	R	Stop lamp switch	[Ignition switch: ON] • Brake pedal: Fully released	Approximately 0 V
			[Ignition switch: ON] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)
100	G	ASCDC brake switch	• Brake pedal: Slightly depressed (A/T, CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	Approximately 0 V
			• Brake pedal: Fully released (A/T, CVT) • Brake pedal and clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14 V)

Diagnosis Procedure

INFOID:000000005532808

1. CHECK OVERALL FUNCTION-I

Ⓟ With CONSULT-III

1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.
3. Check "BRAKE SW1" indication under the following conditions.

M/T models

Condition	Indication
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON

A/T and CVT models

Condition	Indication
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON

ⓧ Without CONSULT-III

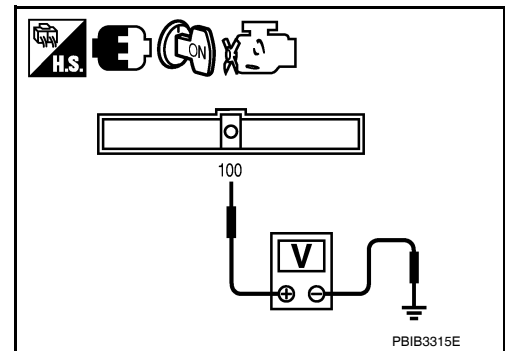
1. Turn ignition switch ON.
2. Check voltage between ECM terminal 100 and ground under the following conditions.

M/T models

Condition	Voltage
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0 V
Clutch pedal and brake pedal: Fully released	Battery voltage

A/T and CVT models

Condition	Voltage
Brake pedal: Slightly depressed	Approximately 0 V
Brake pedal: Fully released	Battery voltage



OK or NG

- OK >> GO TO 2.
- NG (M/T models) >>>GO TO 3.
- NG (A/T and CVT models) >>>GO TO 4.

2. CHECK OVERALL FUNCTION-II

Ⓟ With CONSULT-III

Check "BRAKE SW2" indication in "DATA MONITOR" mode.

DTC P1572 ASCD BRAKE SWITCH

[MR18DE]

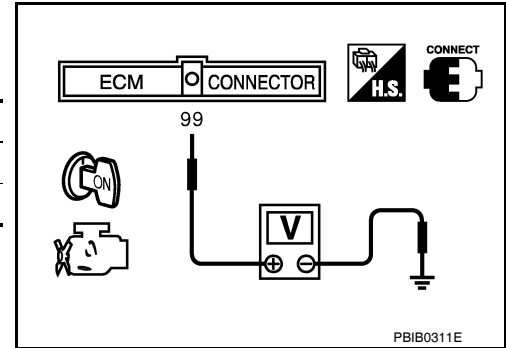
< SERVICE INFORMATION >

Condition	Indication
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

⊗ Without CONSULT-III

Check voltage between ECM terminal 99 and ground under the following conditions.

Condition	Voltage
Brake pedal: Fully released	Approximately 0 V
Brake pedal: Slightly depressed	Battery voltage

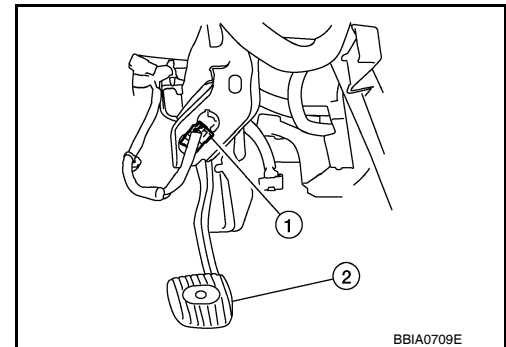


OK or NG

- OK >> GO TO 15.
- NG >> GO TO 11.

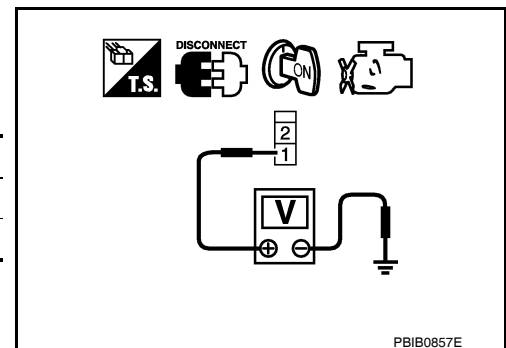
3. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch (1) harness connector.
 - Clutch pedal (2)
3. Turn ignition switch ON.



4. Check voltage between ASCD clutch switch terminal 1 and ground under the following conditions with CONSULT-III or tester.

Condition	Voltage
Brake pedal: Fully released	Battery voltage
Brake pedal: Slightly depressed	Approx. 0 V



OK or NG

- OK >> GO TO 9.
- NG >> GO TO 4.

4. CHECK ASCD BRAKE SWITCH POWER SUPPLY

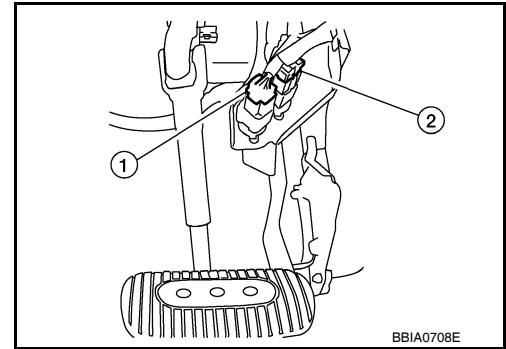
1. Turn ignition switch OFF.

DTC P1572 ASCD BRAKE SWITCH

[MR18DE]

< SERVICE INFORMATION >

2. Disconnect ASCD brake switch (2) harness connector.
 - Stop lamp switch (1)
3. Turn ignition switch ON.

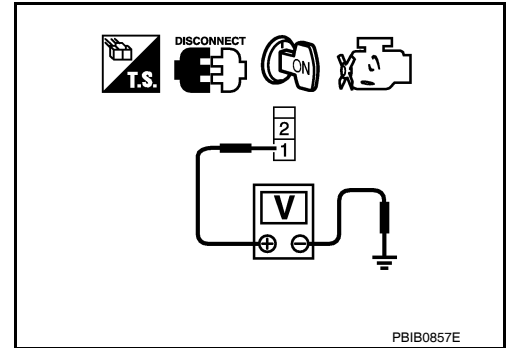


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK (M/T models) >>GO TO 6.
- OK (A/T and CVT models) >>GO TO 7.
- NG >> GO TO 5.



5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M69, E7
- 10 A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 8.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 100 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 8.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK ASCD BRAKE SWITCH

Refer to [EC-938. "Component Inspection"](#).

DTC P1572 ASCD BRAKE SWITCH

[MR18DE]

< SERVICE INFORMATION >

OK or NG

- OK >> GO TO 15.
- NG >> Replace ASCD brake switch.

9. CHECK ASCD CLUTCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 100 and ASCD clutch switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 10.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ASCD CLUTCH SWITCH

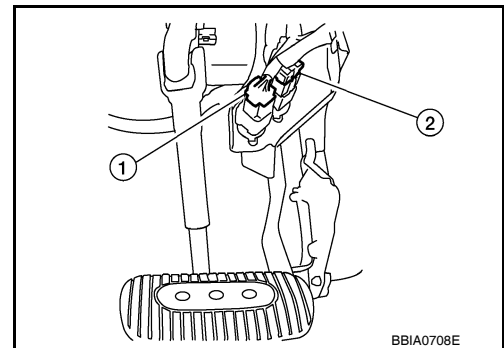
Refer to [EC-938, "Component Inspection"](#)

OK or NG

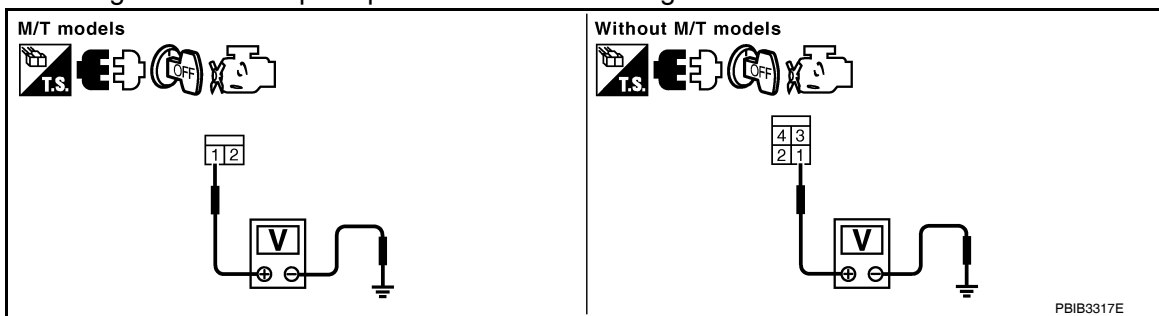
- OK >> GO TO 15.
- NG >> Replace ASCD clutch switch.

11. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch (1) harness connector.
 - ASCD brake switch (2)



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

- OK >> GO TO 13.
- NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M69, E7
- 10 A fuse

DTC P1572 ASCD BRAKE SWITCH

[MR18DE]

< SERVICE INFORMATION >

- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 99 and stop lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK STOP LAMP SWITCH

Refer to [EC-938, "Component Inspection"](#)

OK or NG

OK >> GO TO 15.

NG >> Replace stop lamp switch.

15. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

Component Inspection

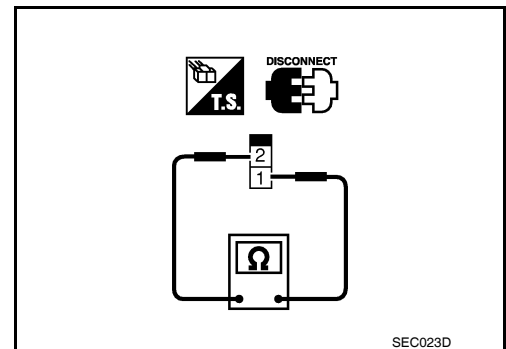
INFOID:000000005532809

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released.	Should exist.
Brake pedal: Slightly depressed.	Should not exist.

If NG, adjust ASCD brake switch installation, refer to [BR-6](#), and perform step 3 again.



ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.

DTC P1572 ASCD BRAKE SWITCH

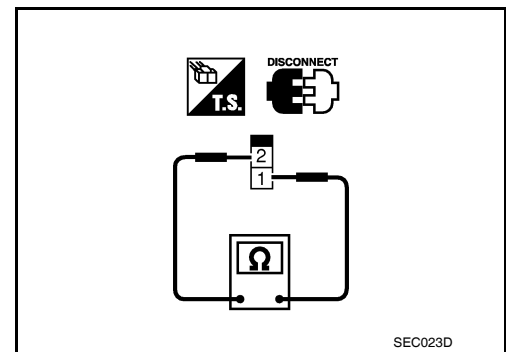
[MR18DE]

< SERVICE INFORMATION >

- Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

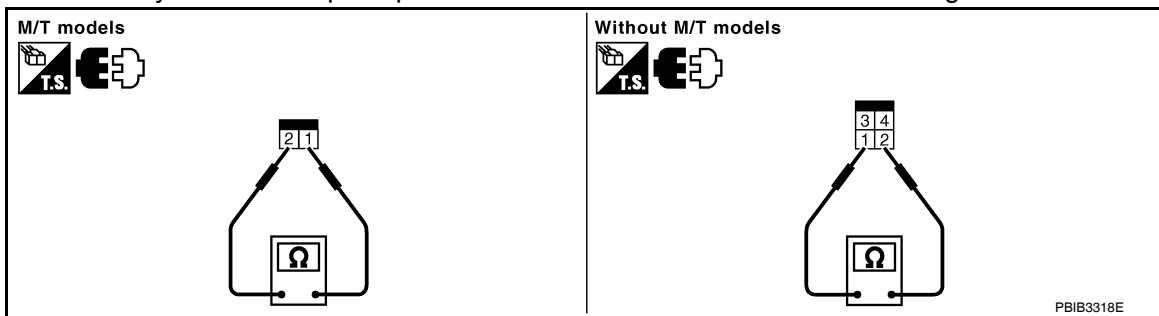
Condition	Continuity
Clutch pedal: Fully released.	Should exist.
Clutch pedal: Slightly depressed.	Should not exist.

If NG, adjust ASCD clutch switch installation, refer to [CL-6](#), and perform step 3 again.



STOP LAMP SWITCH

- Turn ignition switch OFF.
- Disconnect stop lamp switch harness connector.
- Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released.	Should not exist.
Brake pedal: Slightly depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to [BR-6](#), and perform step 3 again.

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

DTC P1574 ASCD VEHICLE SPEED SENSOR

< SERVICE INFORMATION >

[MR18DE]

DTC P1574 ASCD VEHICLE SPEED SENSOR

Component Description

INFOID:000000005532810

The ECM receives two vehicle speed signals via CAN communication line. One is sent from "ABS actuator and electric unit (control unit)" or combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to [EC-522](#) for ASCD functions.

On Board Diagnosis Logic

INFOID:000000005532811

NOTE:

- If DTC P1574 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to [EC-887](#).
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-893](#).
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to [EC-895](#).

This self-diagnosis has the one trip detection logic.

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1574 1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	<ul style="list-style-type: none">• Harness or connectors (CAN communication line is open or shorted.)• Harness or connectors (Combination meter circuit is open or shorted.)• TCM• ABS actuator and electric unit (control unit)• Combination meter• ECM

DTC Confirmation Procedure

INFOID:000000005532812

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Step 3 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

1. Start engine.
2. Drive the vehicle at more than 40 km/h (25MPH).
3. Check DTC.
4. If DTC is detected, go to [EC-940, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005532813

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to [AT-39](#) (A/T) or [CVT-27](#) (CVT).

OK or NG

- OK >> GO TO 2.
- NG >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT"

Refer to [BRC-10](#).

OK or NG

- OK >> GO TO 3.

DTC P1574 ASCD VEHICLE SPEED SENSOR

[MR18DE]

< SERVICE INFORMATION >

NG >> Repair or replace.

3.CHECK COMBINATION METER

Check combination meter function.

Refer to [DI-4](#).

>> INSPECTION END

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

DTC P1715 INPUT SPEED SENSOR

< SERVICE INFORMATION >

[MR18DE]

DTC P1715 INPUT SPEED SENSOR

A/T

A/T : Description

INFOID:000000005532814

ECM receives input speed sensor signal from TCM through CAN communication line. ECM uses this signal for engine control.

A/T : CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532815

Specification data are reference values.

Monitor item	Condition	Specification
I/P PULLY SPD	• Vehicle speed: More than 20 km/h (12MPH)	Almost the same speed as the tachometer indication

A/T : On Board Diagnosis Logic

INFOID:000000005532816

NOTE:

- If DTC P1715 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to [EC-793](#).
- If DTC P1715 is displayed with DTC P0340 first perform the trouble diagnosis for DTC P0340. Refer to [EC-799](#).
- If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-893](#).
- If DTC P1715 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to [EC-895](#).

The MIL will not lights up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715 1715	Input speed sensor (TCM output)	Input speed sensor signal is different from the theoretical value calculated by ECM from output speed sensor signal and engine rpm signal.	<ul style="list-style-type: none">• Harness or connectors (CAN communication line is open or shorted)• Harness or connectors (Input speed sensor circuit is open or shorted)• TCM

A/T : Diagnosis Procedure

INFOID:000000005532817

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to [AT-39](#).

OK or NG

OK >> GO TO 2.

NG >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM. Refer to [AT-42](#).

>> **INSPECTION END**

CVT

CVT : Description

INFOID:000000005532818

ECM receives input speed sensor signal from TCM through CAN communication line.

CVT : CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532819

Specification data are reference values.

DTC P1715 INPUT SPEED SENSOR

< SERVICE INFORMATION >

[MR18DE]

Monitor item	Condition	Specification
I/P PULLY SPD	• Vehicle speed: More than 20 km/h (12MPH)	Almost the same speed as the tachometer indication

CVT : On Board Diagnosis Logic

INFOID:000000005532820

NOTE:

- If DTC P1715 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to [EC-793](#).
- If DTC P1715 is displayed with DTC P0340 first perform the trouble diagnosis for DTC P0340. Refer to [EC-799](#).
- If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-893](#).
- If DTC P1715 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to [EC-895](#).

The MIL will not lights up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715 1715	Input speed sensor (TCM output)	Input speed sensor signal is different from the theoretical value calculated by ECM from output speed sensor signal and engine rpm signal.	<ul style="list-style-type: none">• Harness or connectors (CAN communication line is open or shorted)• Harness or connectors (Input speed sensor circuit is open or shorted)• TCM

CVT : DTC Confirmation Procedure

INFOID:000000005532821

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Start engine.
2. Drive vehicle at a speed of more than 50 km/h (31 MPH) for at least 5 seconds.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to [EC-943, "CVT : Diagnosis Procedure"](#).

CVT : Diagnosis Procedure

INFOID:000000005532822

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to [CVT-27](#).

OK or NG

- OK >> GO TO 2.
- NG >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM. Refer to [CVT-159, "Removal and Installation"](#).

>> INSPECTION END

DTC P1805 BRAKE SWITCH

< SERVICE INFORMATION >

[MR18DE]

DTC P1805 BRAKE SWITCH

Description

INFOID:000000005532823

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532824

Specification data are reference values.

Monitor item	Condition		Specification
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

INFOID:000000005532825

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805 1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	<ul style="list-style-type: none">• Harness or connectors (Stop lamp switch circuit is open or shorted.)• Stop lamp switch

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters in fail-safe mode.

Engine operation condition in fail-safe mode

ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.

Vehicle condition	Driving condition
Engine: Idling	Normal
Accelerating	Poor acceleration

DTC Confirmation Procedure

INFOID:000000005532826

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC.
4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to [EC-946. "Diagnosis Procedure"](#).

DTC P1805 BRAKE SWITCH





< SERVICE INFORMATION >

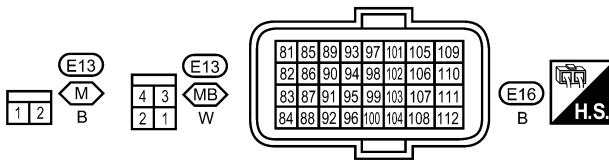
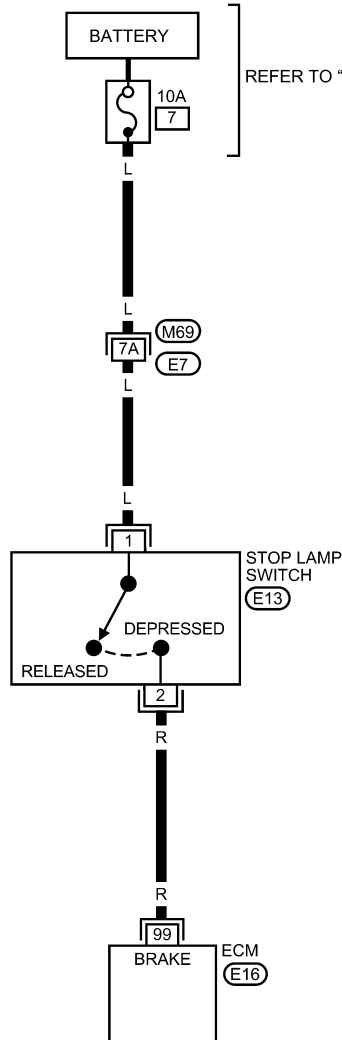
[MR18DE]


INFOID:000000005532827

Wiring Diagram

EC-BRK/SW-01

-  : DETECTABLE LINE FOR DTC
-  : NON-DETECTABLE LINE FOR DTC
-  : WITH M/T
-  : WITHOUT M/T



REFER TO THE FOLLOWING.
 - SUPER MULTIPLE JUNCTION (SMJ)

AABWA0322GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

A
 EC
 C
 D
 E
 F
 G
 H
 I
 J
 K
 L
 M
 N
 O
 P

DTC P1805 BRAKE SWITCH

[MR18DE]

< SERVICE INFORMATION >

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
99	R	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0 V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)

Diagnosis Procedure

INFOID:000000005532828

1. CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

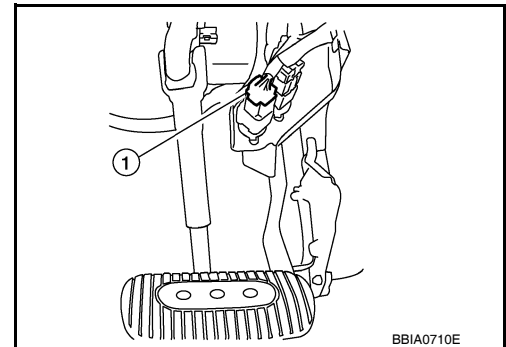
Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

OK or NG

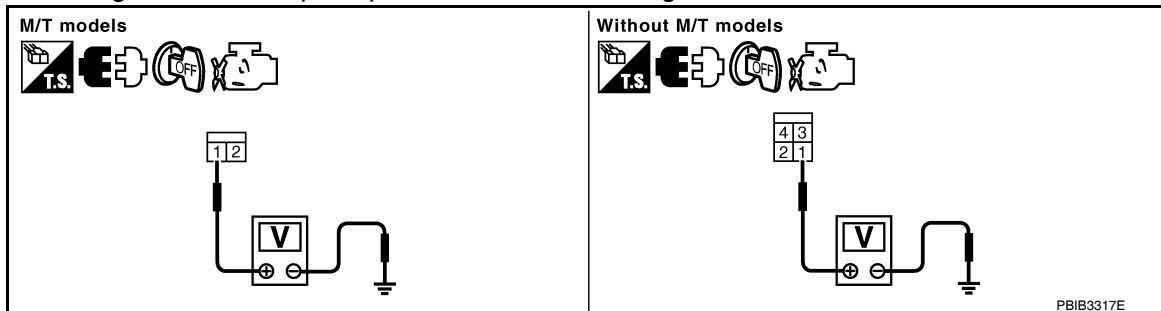
- OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch (1) harness connector.



2. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M69, E7
- 10 A fuse
- Harness for open and short between stop lamp switch and battery

DTC P1805 BRAKE SWITCH

[MR18DE]

< SERVICE INFORMATION >

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect stop lamp switch (1) harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between stop lamp switch terminal 2 and ECM terminal 99.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.

NG >> Repair open circuit or short to ground or short to power in harness connectors.

5. CHECK STOP LAMP SWITCH

Refer to [EC-947, "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace stop lamp switch.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

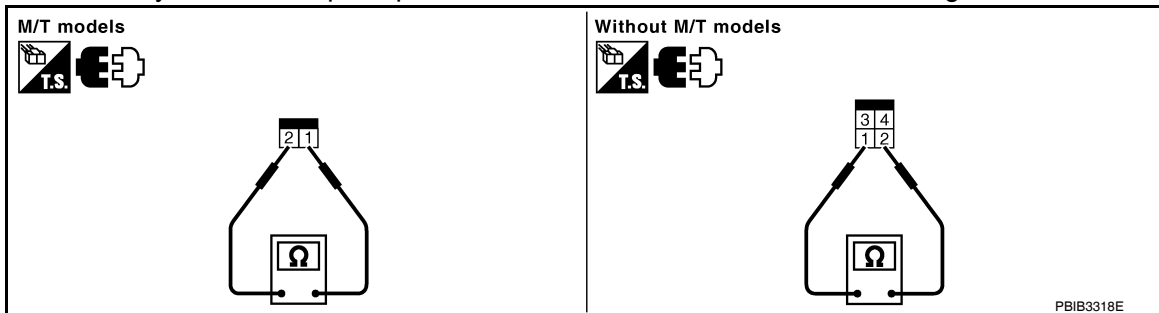
>> **INSPECTION END**

Component Inspection

INFOID:000000005532829

STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released.	Should not exist.
Brake pedal: Slightly depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to [BR-6](#), and perform step 3 again.

DTC P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< SERVICE INFORMATION >

[MR18DE]

DTC P2100, P2103 THROTTLE CONTROL MOTOR RELAY

Component Description

INFOID:000000005532830

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532831

Specification data are reference values.

Monitor item	Condition	Specification
THRTL RELAY	• Ignition switch: ON	ON

On Board Diagnosis Logic

INFOID:000000005532832

These self-diagnoses have one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2100 2100	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	<ul style="list-style-type: none">• Harness or connectors (Throttle control motor relay circuit is open)• Throttle control motor relay
P2103 2103	Throttle control motor relay circuit short	ECM detects the throttle control motor relay is stuck ON.	<ul style="list-style-type: none">• Harness or connectors (Throttle control motor relay circuit is shorted)• Throttle control motor relay

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:000000005532833

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P2100

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check 1st trip DTC.
4. If DTC is detected, go to [EC-950, "Diagnosis Procedure"](#).

PROCEDURE FOR DTC P2103

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-950, "Diagnosis Procedure"](#).

DTC P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< SERVICE INFORMATION >

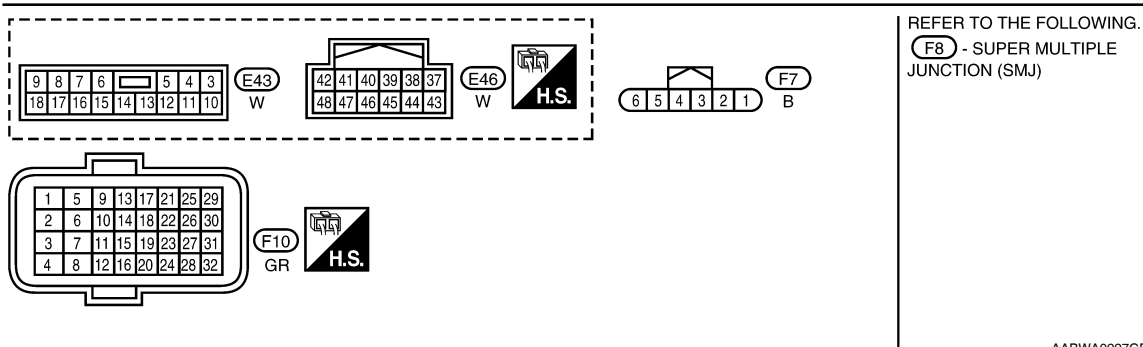
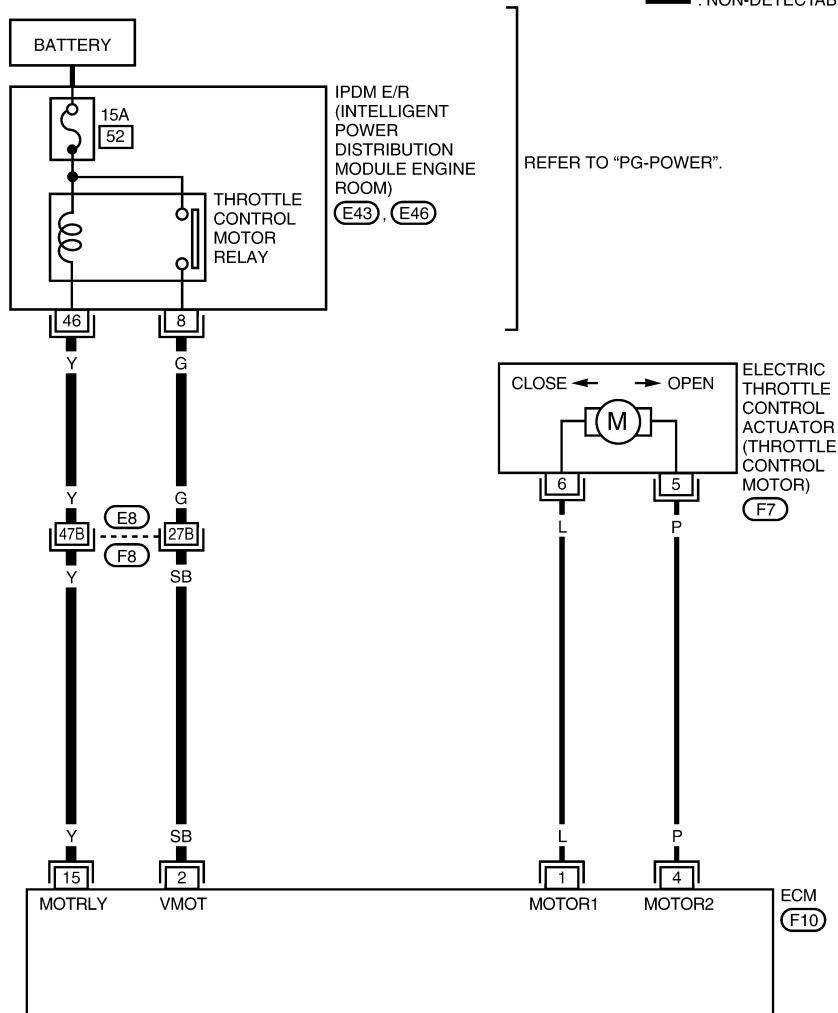
[MR18DE]

Wiring Diagram

INFOID:000000005532834

EC-ETC2-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
 (F8) - SUPER MULTIPLE JUNCTION (SMJ)

AABWA0227GB

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

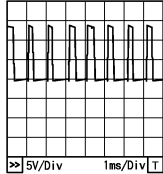
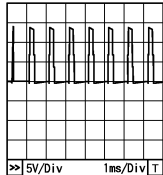
CAUTION:

DTC P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< SERVICE INFORMATION >

[MR18DE]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L	Throttle control motor (Open)	[Ignition switch: ON] <ul style="list-style-type: none"> • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed 	Approximately 3.2 V★  PBIAB150J
2	SB	Throttle control motor power supply	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
4	P	Throttle control motor (Close)	[Ignition switch: ON] <ul style="list-style-type: none"> • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released 	Approximately 1.8 V★  PBIAB149J
15	Y	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
			[Ignition switch: ON]	0 - 1.0 V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005532835

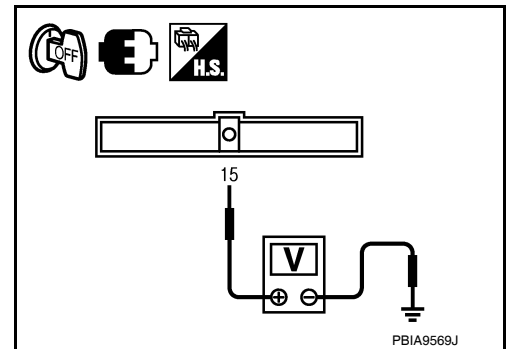
1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM terminal 15 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 5.
NG >> GO TO 2.



2. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E46.
3. Check continuity between ECM terminal 15 and IPDM E/R terminal 46. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.

DTC P2100, P2103 THROTTLE CONTROL MOTOR RELAY

[MR18DE]

< SERVICE INFORMATION >

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUSE

1. Disconnect 15 A fuse.
2. Check 15 A fuse for blown.

OK or NG

- OK >> GO TO 8.
- NG >> Replace 15 A fuse.

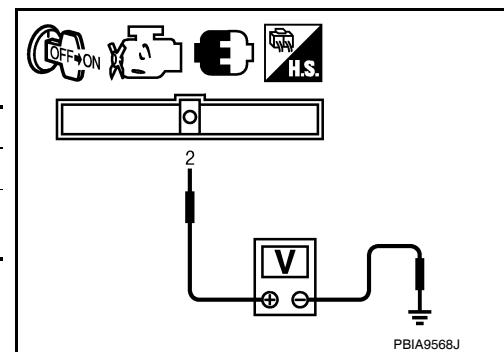
5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

Check voltage between ECM terminal 2 and ground under the following conditions with CONSULT-III or tester.

Ignition switch	Voltage
OFF	Approximately 0 V
ON	Battery voltage (11 - 14 V)

OK or NG

- OK >> GO TO 8.
- NG >> GO TO 6.



6. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector E43.
4. Check continuity between ECM terminal 2 and IPDM E/R terminal 8. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 8.
- NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-28. "Removal and Installation of IPDM E/R"](#).
- NG >> Repair or replace harness or connectors.

DTC P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< SERVICE INFORMATION >

[MR18DE]

DTC P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:000000005532836

NOTE:

If DTC P2101 is displayed with DTC P2100 or P2119, first perform the trouble diagnosis for DTC P2100 or P2119. Refer to [EC-948](#) or [EC-963](#).

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.

The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

INFOID:000000005532837

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2101 2101	Electric throttle control performance	Electric throttle control function does not operate properly.	<ul style="list-style-type: none">• Harness or connectors (Throttle control motor circuit is open or shorted)• Electric throttle control actuator

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:000000005532838

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running.

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.
4. If DTC is detected, go to [EC-954, "Diagnosis Procedure"](#).

DTC P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< SERVICE INFORMATION >

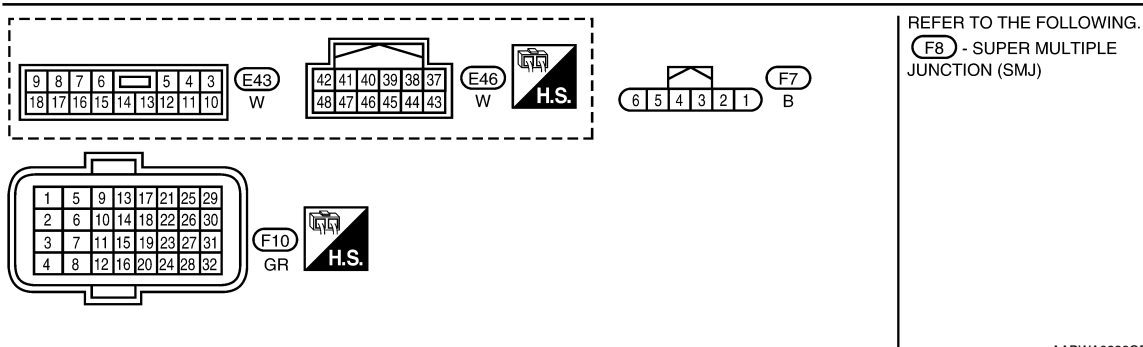
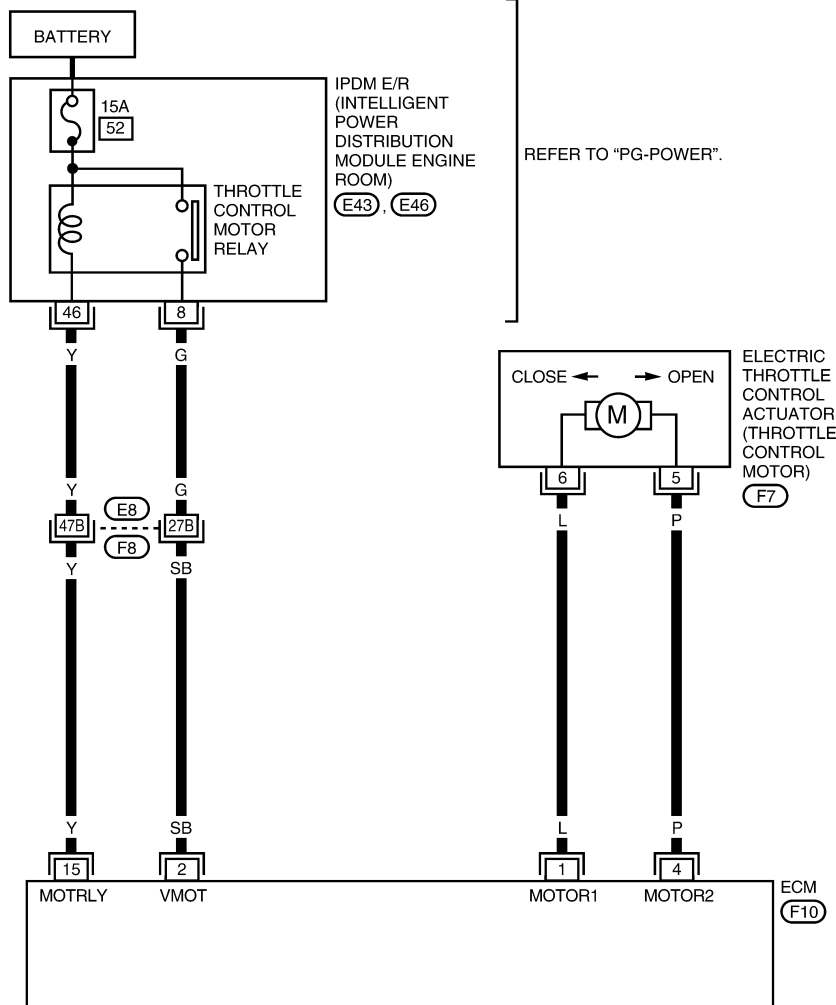
[MR18DE]

Wiring Diagram

INFOID:000000005532839

EC-ETC1-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

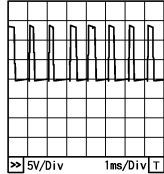
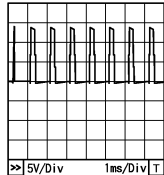
CAUTION:

DTC P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< SERVICE INFORMATION >

[MR18DE]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L	Throttle control motor (Open)	[Ignition switch: ON] <ul style="list-style-type: none"> • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed 	Approximately 3.2 V★  <small>PBIA8150J</small>
2	SB	Throttle control motor power supply	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
4	P	Throttle control motor (Close)	[Ignition switch: ON] <ul style="list-style-type: none"> • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released 	Approximately 1.8 V★  <small>PBIA8149J</small>
15	Y	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
			[Ignition switch: ON]	0 - 1.0 V

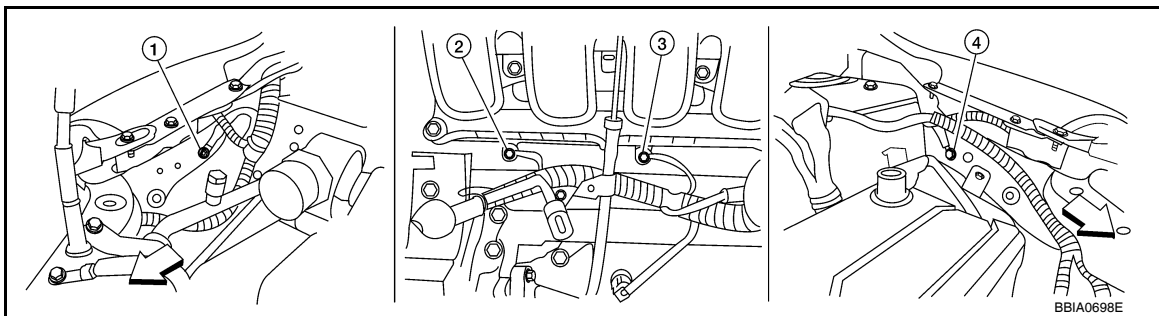
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005532840

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
Refer to [EC-638, "Ground Inspection"](#).



↔: Vehicle front

1. Body ground E24

2. Engine ground F9

3. Engine ground F16

4. Body ground E15

OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

DTC P2101 ELECTRIC THROTTLE CONTROL FUNCTION

[MR18DE]

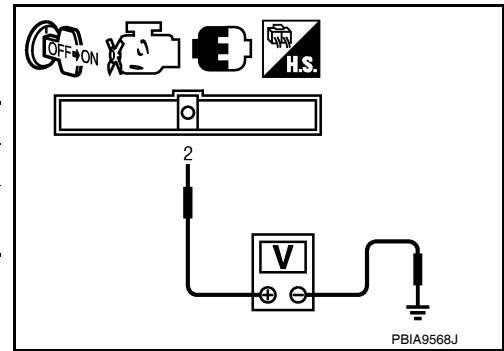
< SERVICE INFORMATION >

Check voltage between ECM terminal 2 and ground under the following conditions with CONSULT-III or tester.

Ignition switch	Voltage
OFF	Approximately 0 V
ON	Battery voltage (11 - 14 V)

OK or NG

- OK >> GO TO 10.
- NG >> GO TO 3.



3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector E43.
4. Check continuity between ECM terminal 2 and IPDM E/R terminal 8.
Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

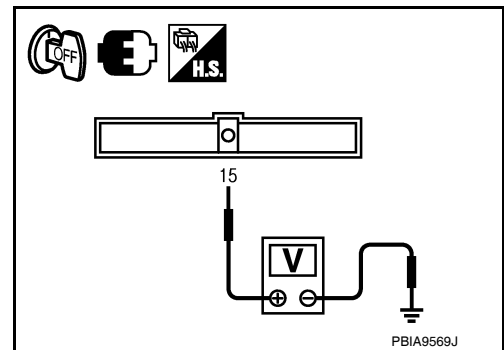
5. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Reconnect all harness connectors disconnected.
2. Check voltage between ECM terminal 15 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 9.
- NG >> GO TO 6.



6. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E46.
3. Check harness continuity between ECM terminal 15 and IPDM E/R terminal 46.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 8.
- NG >> GO TO 7.

DTC P2101 ELECTRIC THROTTLE CONTROL FUNCTION

[MR18DE]

< SERVICE INFORMATION >

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK FUSE

1. Disconnect 15 A fuse.
2. Check 15 A fuse for blown.

OK or NG

- OK >> GO TO 9.
- NG >> Replace 15 A fuse.

9. CHECK INTERMITTENT INCIDENT

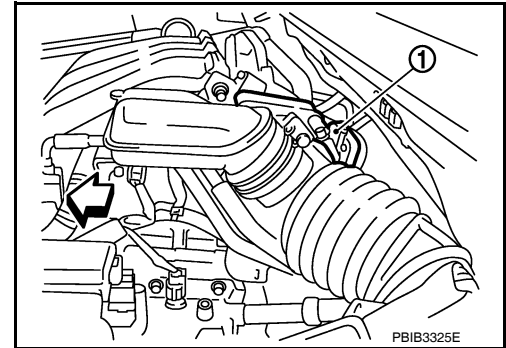
Refer to [EC-632](#).

OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-28, "Removal and Installation of IPDM E/R"](#).
- NG >> Repair or replace harness or connectors.

10. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator (1) harness connector.
 - ⇐: Vehicle front
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.



Electric throttle control actuator terminal	ECM terminal	Continuity
5	1	Should not exist.
	4	Should exist.
6	1	Should exist.
	4	Should not exist.

5. Also check harness for short to ground and short to power.

OK or NG

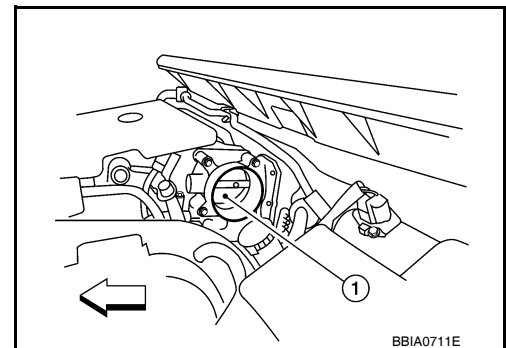
- OK >> GO TO 11.
- NG >> Repair or replace.

11. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve (1) and the housing.
 - ⇐: Vehicle front

OK or NG

- OK >> GO TO 12.
- NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



12. CHECK THROTTLE CONTROL MOTOR

DTC P2101 ELECTRIC THROTTLE CONTROL FUNCTION

[MR18DE]

< SERVICE INFORMATION >

Refer to [EC-957](#), "Component Inspection".

OK or NG

- OK >> GO TO 13.
- NG >> GO TO 14.

13. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

OK or NG

- OK >> GO TO 14.
- NG >> Repair or replace harness or connectors.

14. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-580](#), "Throttle Valve Closed Position Learning".
3. Perform [EC-580](#), "Idle Air Volume Learning".

>> INSPECTION END

Component Inspection

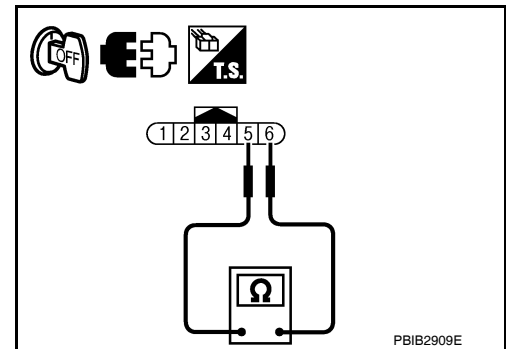
INFOID:000000005532841

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 5 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]

3. If NG, replace electric throttle control actuator and go to next step.
4. Perform [EC-580](#), "Throttle Valve Closed Position Learning".
5. Perform [EC-580](#), "Idle Air Volume Learning".



INFOID:000000005532842

Removal and Installation

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-137](#).

DTC P2118 THROTTLE CONTROL MOTOR

< SERVICE INFORMATION >

[MR18DE]

DTC P2118 THROTTLE CONTROL MOTOR

Component Description

INFOID:000000005532843

The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

INFOID:000000005532844

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2118 2118	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	<ul style="list-style-type: none">• Harness or connectors (Throttle control motor circuit is shorted.)• Electric throttle control actuator (Throttle control motor)

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:000000005532845

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.
4. If DTC is detected, go to [EC-960, "Diagnosis Procedure"](#).

DTC P2118 THROTTLE CONTROL MOTOR

< SERVICE INFORMATION >

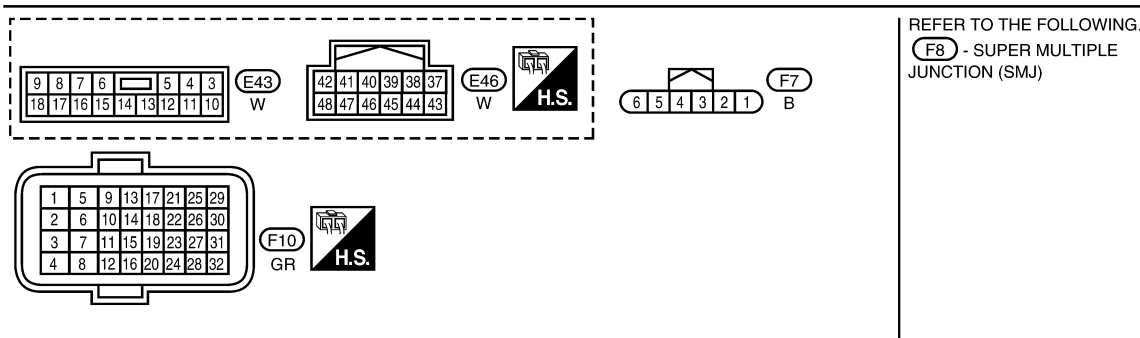
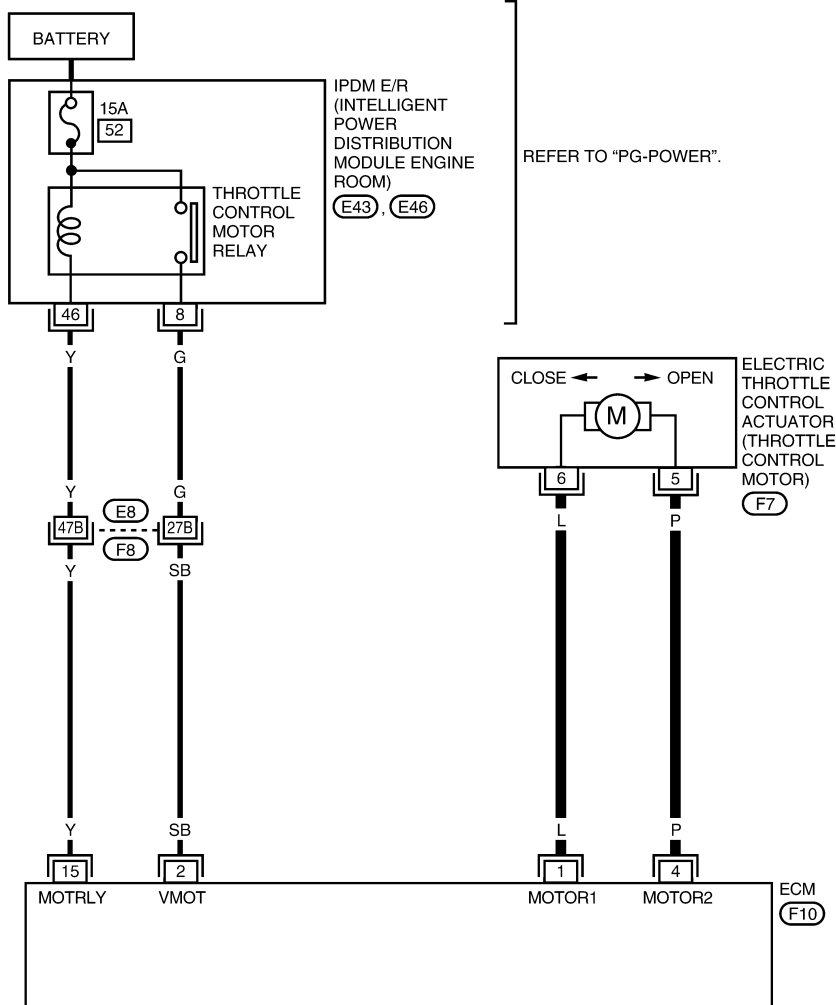
[MR18DE]

Wiring Diagram

INFOID:000000005532846

EC-ETC3-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

CAUTION:

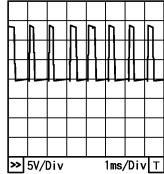
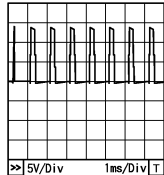
A
 EC
 C
 D
 E
 F
 G
 H
 I
 J
 K
 L
 M
 N
 O
 P

DTC P2118 THROTTLE CONTROL MOTOR

< SERVICE INFORMATION >

[MR18DE]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L	Throttle control motor (Open)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Approximately 3.2 V★  PBIAB150J
2	SB	Throttle control motor power supply	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
4	P	Throttle control motor (Close)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Approximately 1.8 V★  PBIAB149J
15	Y	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
			[Ignition switch: ON]	0 - 1.0 V

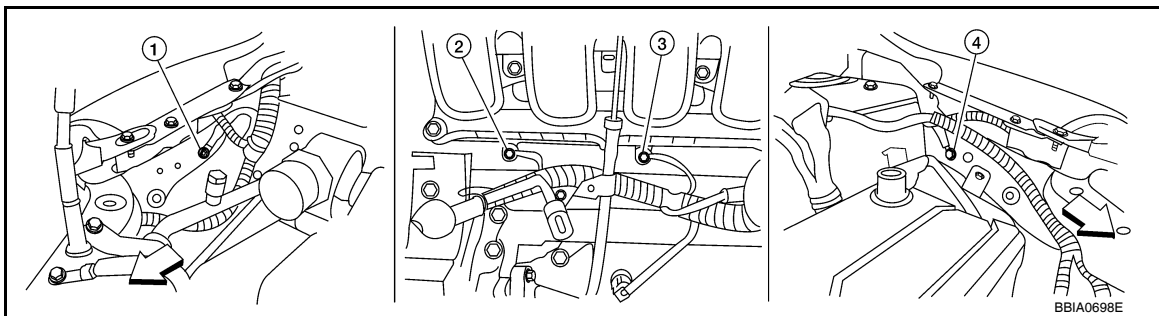
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005532847

1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten engine screw on the body.
Refer to [EC-638, "Ground Inspection"](#).



↔: Vehicle front

1. Body ground E24

2. Engine ground F9

3. Engine ground F16

4. Body ground E15

OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

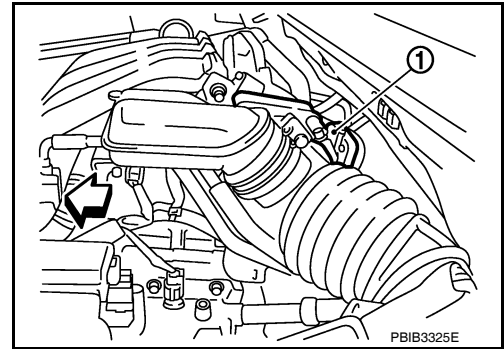
2. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

DTC P2118 THROTTLE CONTROL MOTOR

[MR18DE]

< SERVICE INFORMATION >

1. Disconnect electric throttle control actuator (1) harness connector.
 - ⇐: Vehicle front
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.



Electric throttle control actuator terminal	ECM terminal	Continuity
5	1	Should not exist.
	4	Should exist.
6	1	Should exist.
	4	Should not exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 3.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK THROTTLE CONTROL MOTOR

Refer to [EC-961, "Component Inspection"](#).

OK or NG

- OK >> GO TO 4.
- NG >> GO TO 5.

4. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

OK or NG

- OK >> GO TO 5.
- NG >> Repair or replace harness or connectors.

5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-580, "Idle Air Volume Learning"](#).

>> INSPECTION END

Component Inspection

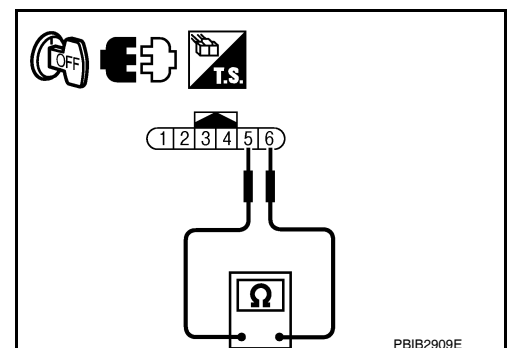
INFOID:000000005532848

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 5 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]

3. If NG, replace electric throttle control actuator and go to next step.
4. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
5. Perform [EC-580, "Idle Air Volume Learning"](#).



INFOID:000000005532849

Removal and Installation

ELECTRIC THROTTLE CONTROL ACTUATOR

DTC P2118 THROTTLE CONTROL MOTOR

< SERVICE INFORMATION >

[MR18DE]

Refer to [EM-137](#).

DTC P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< SERVICE INFORMATION >

[MR18DE]

DTC P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

Component Description

INFOID:000000005532850

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

INFOID:000000005532851

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P2119 2119	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	• Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detects the throttle valve is stuck open.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Malfunction A	ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
Malfunction B	ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
Malfunction C	While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position (A/T, CVT), neutral (M/T), and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

INFOID:000000005532852

NOTE:

- Perform **PROCEDURE FOR MALFUNCTION A AND B** first. If the DTC cannot be confirmed, perform **PROCEDURE FOR MALFUNCTION C**.
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A AND B

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D position (A/T, CVT) or 1st position (M/T), and wait at least 3 seconds.
3. Set shift lever to P position (A/T, CVT) or Neutral position (M/T).
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Set shift lever to D position (A/T, CVT) or 1st position (M/T), and wait at least 3 seconds.
7. Set shift lever to P position (A/T, CVT) or Neutral position (M/T).
8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
9. Check DTC.
10. If DTC is detected, go to [EC-964. "Diagnosis Procedure"](#).

PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D position (A/T, CVT) or 1st position (M/T) and wait at least 3 seconds.

DTC P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

[MR18DE]

< SERVICE INFORMATION >

3. Set shift lever to N, P position (A/T, CVT) or Neutral (M/T) position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.
6. If DTC is detected, go to [EC-964. "Diagnosis Procedure"](#).

Diagnosis Procedure

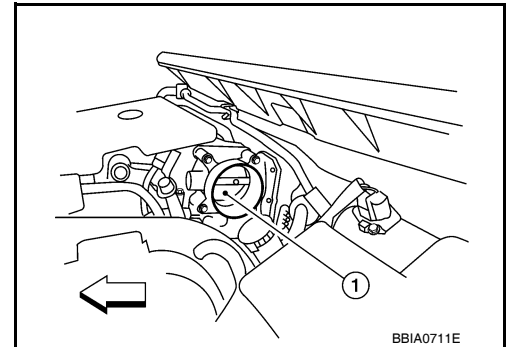
INFOID:000000005532853

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
 2. Remove the intake air duct.
 3. Check if a foreign matter is caught between the throttle valve (1) and the housing.
- ↶: Vehicle front

OK or NG

- OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-580. "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-580. "Idle Air Volume Learning"](#).

>> INSPECTION END

DTC P2122, P2123 APP SENSOR

< SERVICE INFORMATION >

[MR18DE]

DTC P2122, P2123 APP SENSOR

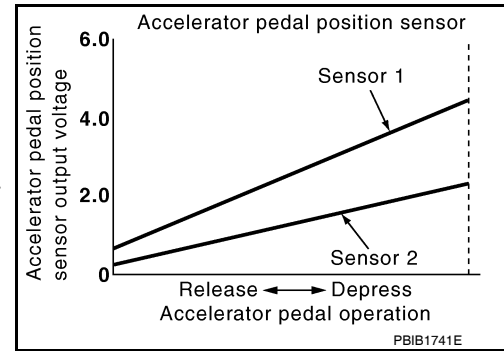
Component Description

INFOID:000000005532854

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532855

Specification data are reference values.

Monitor item	Condition	Specification
ACCEL SEN 1	• Ignition switch: ON (Engine stopped) Accelerator pedal: Fully released	0.6 - 0.9 V
	Accelerator pedal: Fully depressed	4.0 - 4.8 V
ACCEL SEN 2*	• Ignition switch: ON (Engine stopped) Accelerator pedal: Fully released	0.6 - 0.9 V
	Accelerator pedal: Fully depressed	3.9 - 4.8 V
CLSD THL POS	• Ignition switch: ON (Engine stopped) Accelerator pedal: Fully released	ON
	Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

INFOID:000000005532856

These self-diagnoses have the one trip detection logic.

NOTE:

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-896](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122 2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)
P2123 2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:000000005532857

NOTE:

DTC P2122, P2123 APP SENSOR

[MR18DE]

< SERVICE INFORMATION >

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

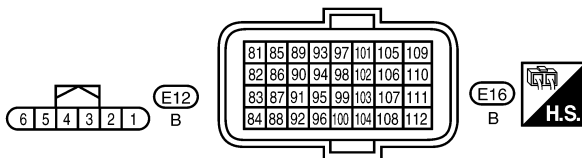
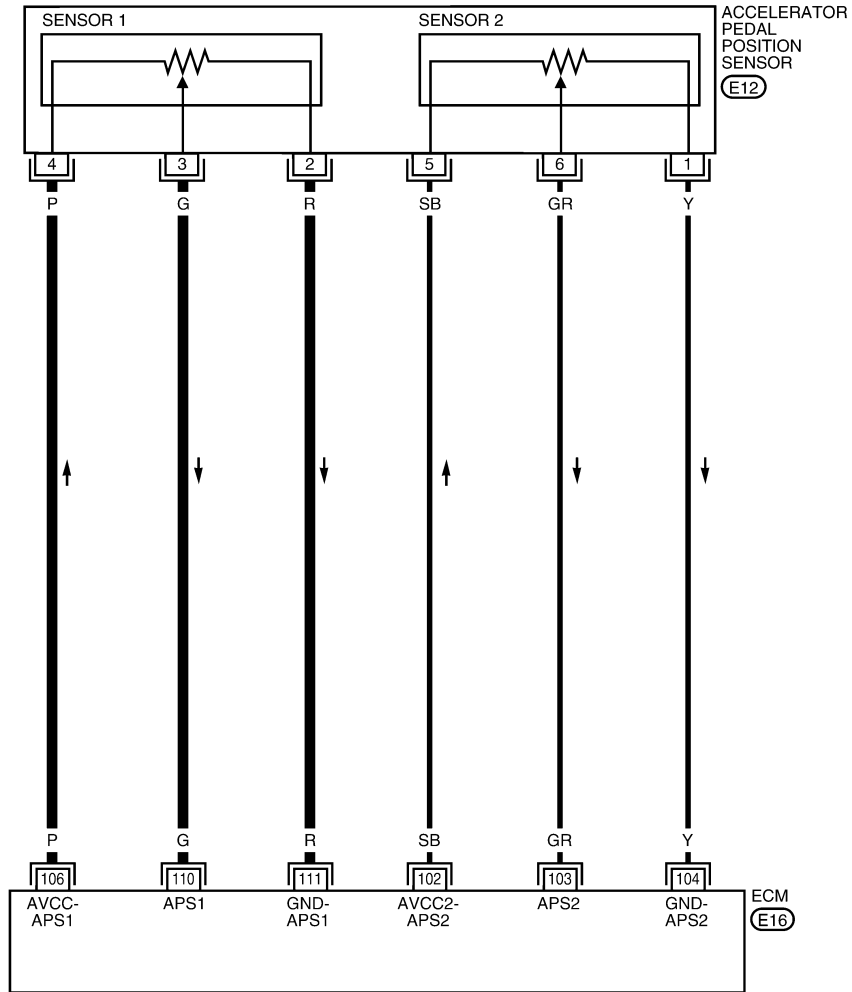
1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-967. "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000005532858

EC-APPS1-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



DTC P2122, P2123 APP SENSOR

< SERVICE INFORMATION >

[MR18DE]

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

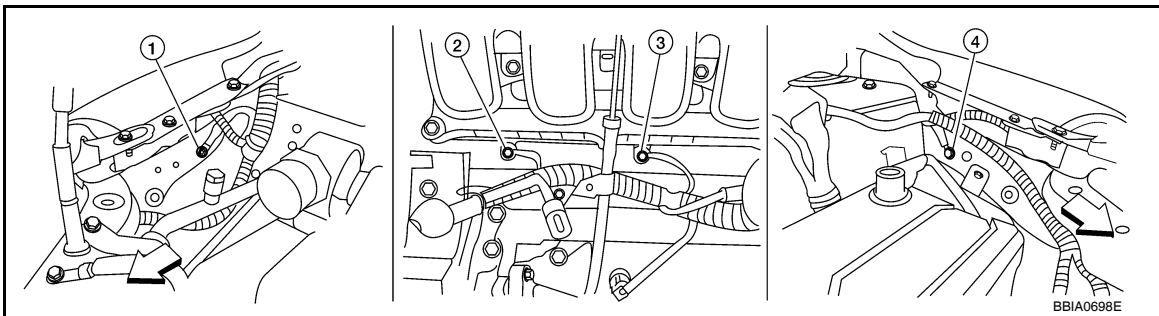
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	SB	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5 V
103	GR	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6 V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4 V
104	Y	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
106	P	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5 V
110	G	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9 V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7 V
111	R	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V

Diagnosis Procedure

INFOID:000000005532859

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
Refer to [EC-638, "Ground Inspection"](#).



↶ Vehicle front

1. Body ground E24
4. Body ground E15

2. Engine ground F9

3. Engine ground F16

OK or NG

OK >> GO TO 2.

DTC P2122, P2123 APP SENSOR

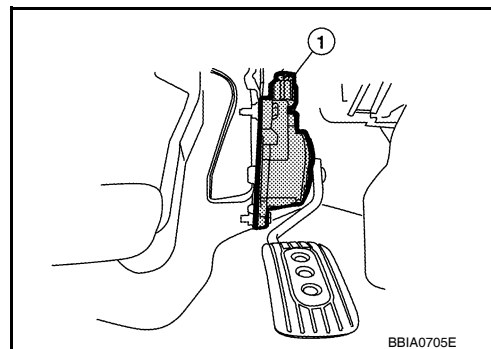
[MR18DE]

< SERVICE INFORMATION >

NG >> Repair or replace ground connections.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.



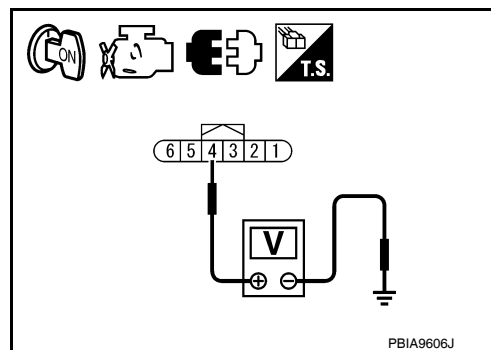
3. Check voltage between APP sensor terminal 4 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V

OK or NG

OK >> GO TO 3.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 111 and APP sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 110 and APP sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to [EC-969, "Component Inspection"](#).

OK or NG

OK >> GO TO 7.

NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.

DTC P2122, P2123 APP SENSOR

[MR18DE]

< SERVICE INFORMATION >

2. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-580, "Idle Air Volume Learning"](#).

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> INSPECTION END

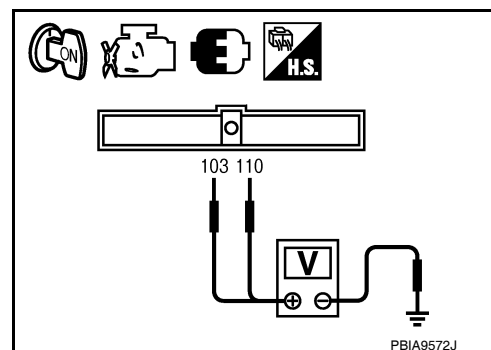
Component Inspection

INFOID:000000005532860

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 110 (APP sensor 1 signal), 103 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
110 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.9 V
	Fully depressed	3.9 - 4.7 V
103 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.6 V
	Fully depressed	1.95 - 2.4 V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-580, "Idle Air Volume Learning"](#).

Removal and Installation

INFOID:000000005532861

ACCELERATOR PEDAL

Refer to [ACC-4](#).

DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >

[MR18DE]

DTC P2127, P2128 APP SENSOR

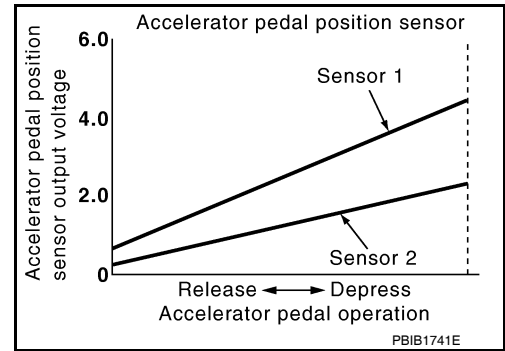
Component Description

INFOID:000000005532862

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532863

Specification data are reference values.

Monitor item	Condition	Specification
ACCEL SEN 1	• Ignition switch: ON (Engine stopped) Accelerator pedal: Fully released	0.6 - 0.9 V
	Accelerator pedal: Fully depressed	4.0 - 4.8 V
ACCEL SEN 2*	• Ignition switch: ON (Engine stopped) Accelerator pedal: Fully released	0.6 - 0.9 V
	Accelerator pedal: Fully depressed	3.9 - 4.8 V
CLSD THL POS	• Ignition switch: ON (Engine stopped) Accelerator pedal: Fully released	ON
	Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

INFOID:000000005532864

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127 2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	<ul style="list-style-type: none"> • Harness or connectors (APP sensor 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor
P2128 2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >

[MR18DE]

DTC Confirmation Procedure

INFOID:000000005532865

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-973. "Diagnosis Procedure"](#).

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >

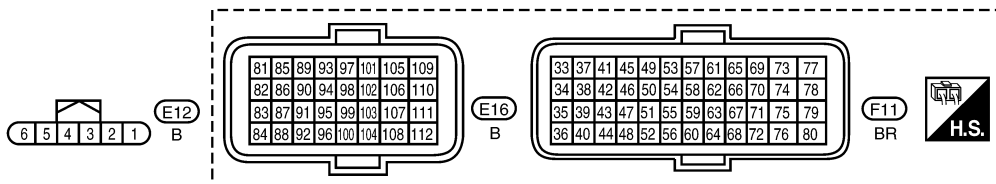
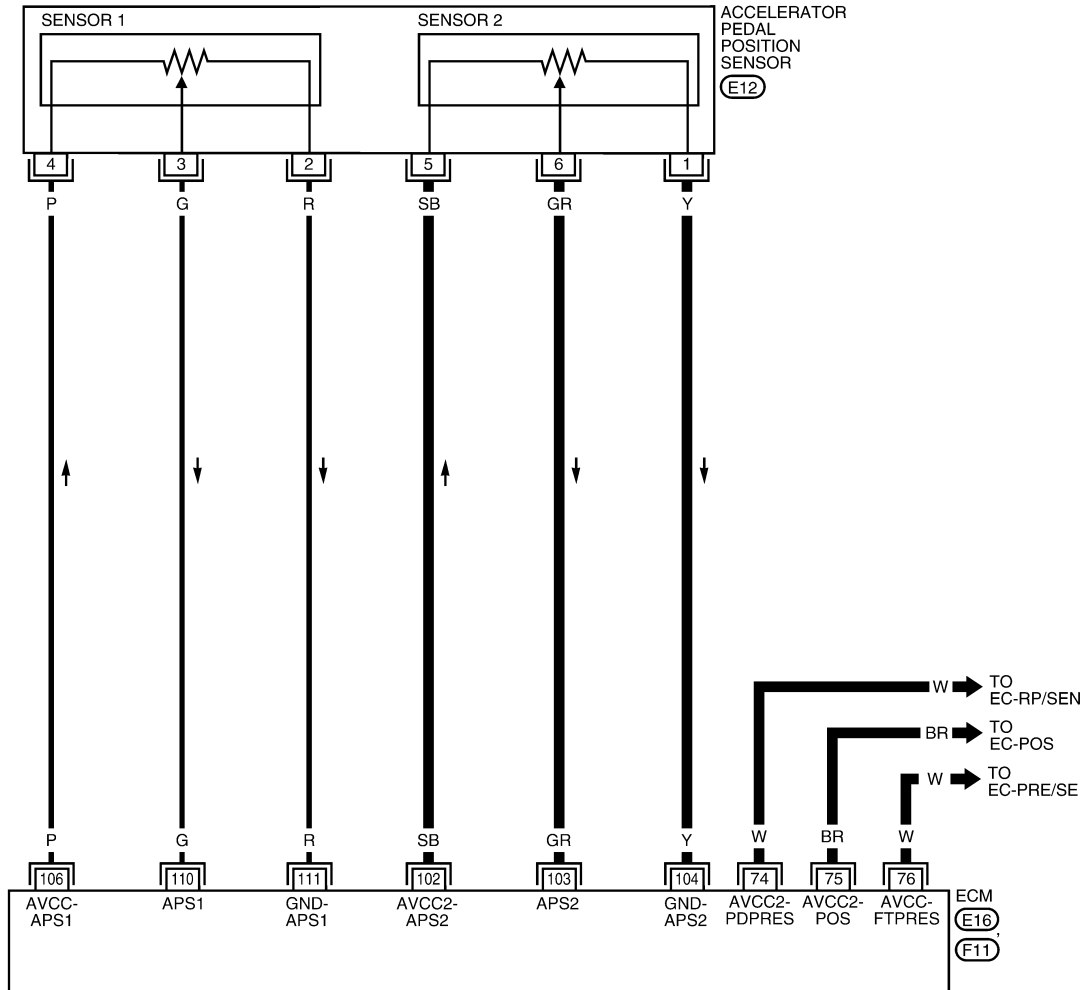
[MR18DE]

Wiring Diagram

INFOID:000000005532866

EC-APPS2-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA3074E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >

[MR18DE]

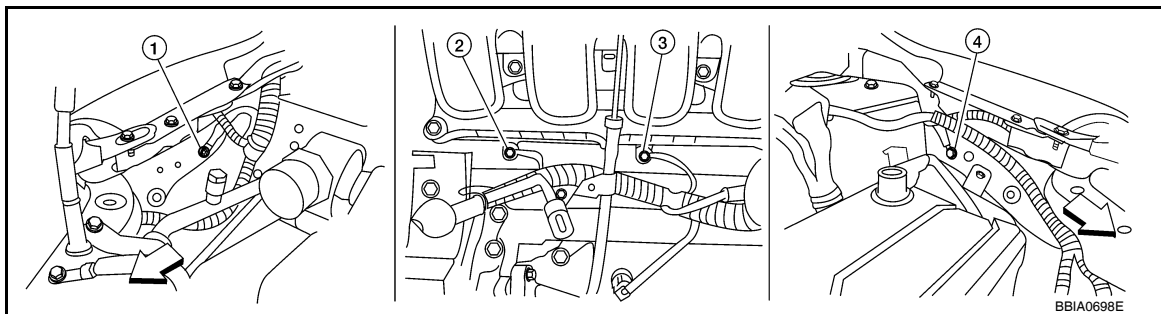
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	W	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	Approximately 5 V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	[Ignition switch: ON]	Approximately 5 V
76	W	EVAP control system pressure sensor power supply	[Ignition switch: ON]	Approximately 5 V
102	SB	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5 V
103	GR	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6 V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4 V
104	Y	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
106	P	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5 V
110	G	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9 V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7 V
111	R	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V

Diagnosis Procedure

INFOID:000000005532867

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
Refer to [EC-638, "Ground Inspection"](#).



← Vehicle front

1. Body ground E24
4. Body ground E15

2. Engine ground F9

3. Engine ground F16

DTC P2127, P2128 APP SENSOR

[MR18DE]

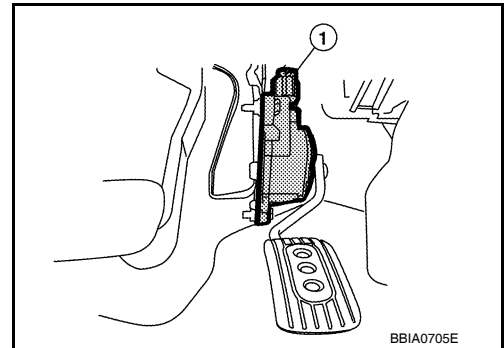
< SERVICE INFORMATION >

OK or NG

- OK >> GO TO 2.
- NG >> Repair or replace ground connections.

2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.

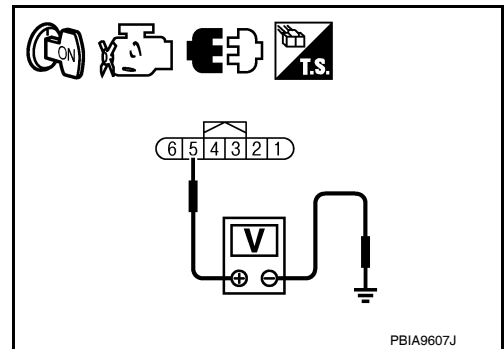


3. Check voltage between APP sensor terminal 5 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V

OK or NG

- OK >> GO TO 6.
- NG >> GO TO 3.



3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 5 and ECM terminal 102. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

- OK >> GO TO 4.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COMPONENTS POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
74	Refrigerant pressure sensor terminal 3	EC-1029, "Wiring Diagram"
75	Crankshaft position sensor (POS) terminal 1	EC-794, "Wiring Diagram"
76	EVAP control system pressure sensor terminal 3	EC-853, "Wiring Diagram"
102	APP sensor terminal 5	EC-972, "Wiring Diagram"

OK or NG

- OK >> GO TO 5.
- NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to [EC-798, "Component Inspection"](#).)
- EVAP control system pressure sensor (Refer to [EC-850, "Component Inspection"](#).)

DTC P2127, P2128 APP SENSOR

[MR18DE]

< SERVICE INFORMATION >

- Refrigerant pressure sensor (Refer to [MTC-38](#).)

OK or NG

- OK >> GO TO 10.
- NG >> Replace malfunctioning component.

6. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 104 and APP sensor terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 7.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 103 and APP sensor terminal 6.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 8.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK APP SENSOR

Refer to [EC-975, "Component Inspection"](#).

OK or NG

- OK >> GO TO 10.
- NG >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-580, "Idle Air Volume Learning"](#).

>> INSPECTION END

10. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> INSPECTION END

Component Inspection

INFOID:000000005532868

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.

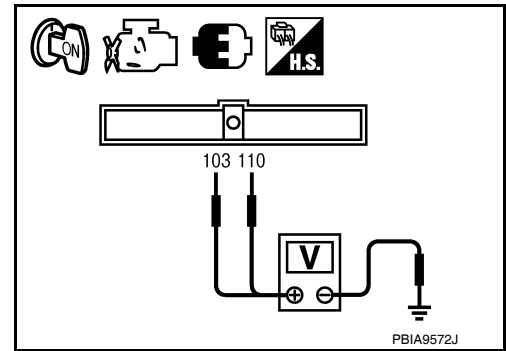
DTC P2127, P2128 APP SENSOR

[MR18DE]

< SERVICE INFORMATION >

3. Check voltage between ECM terminals 110 (APP sensor 1 signal), 103 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
110 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.9 V
	Fully depressed	3.9 - 4.7 V
103 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.6 V
	Fully depressed	1.95 - 2.4 V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-580, "Idle Air Volume Learning"](#).

Removal and Installation

INFOID:000000005532869

ACCELERATOR PEDAL

Refer to [ACC-4](#).

DTC P2135 TP SENSOR

< SERVICE INFORMATION >

[MR18DE]

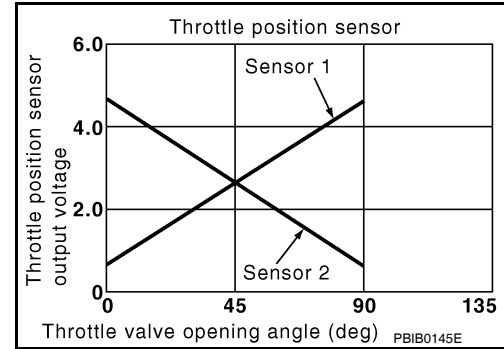
DTC P2135 TP SENSOR

Component Description

INFOID:000000005532870

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532871

Specification data are reference values.

Monitor item	Condition	Specification
TP SEN 1-B1 TP SEN 2-B1*	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released
	Shift lever: D (A/T, CVT), 1st (M/T)	Accelerator pedal: Fully depressed
		More than 0.36 V
		Less than 4.75 V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

INFOID:000000005532872

This self-diagnosis has the one trip detection logic.

NOTE:

If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Refer to [EC-896](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135 2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	<ul style="list-style-type: none"> Harness or connector (TP sensor 1 and 2 circuit is open or shorted.) Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:000000005532873

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

1. Start engine and let it idle for 1 second.
2. Check DTC.

DTC P2135 TP SENSOR

[MR18DE]

< SERVICE INFORMATION >

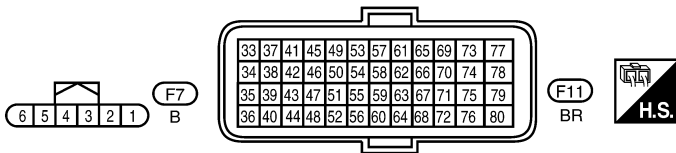
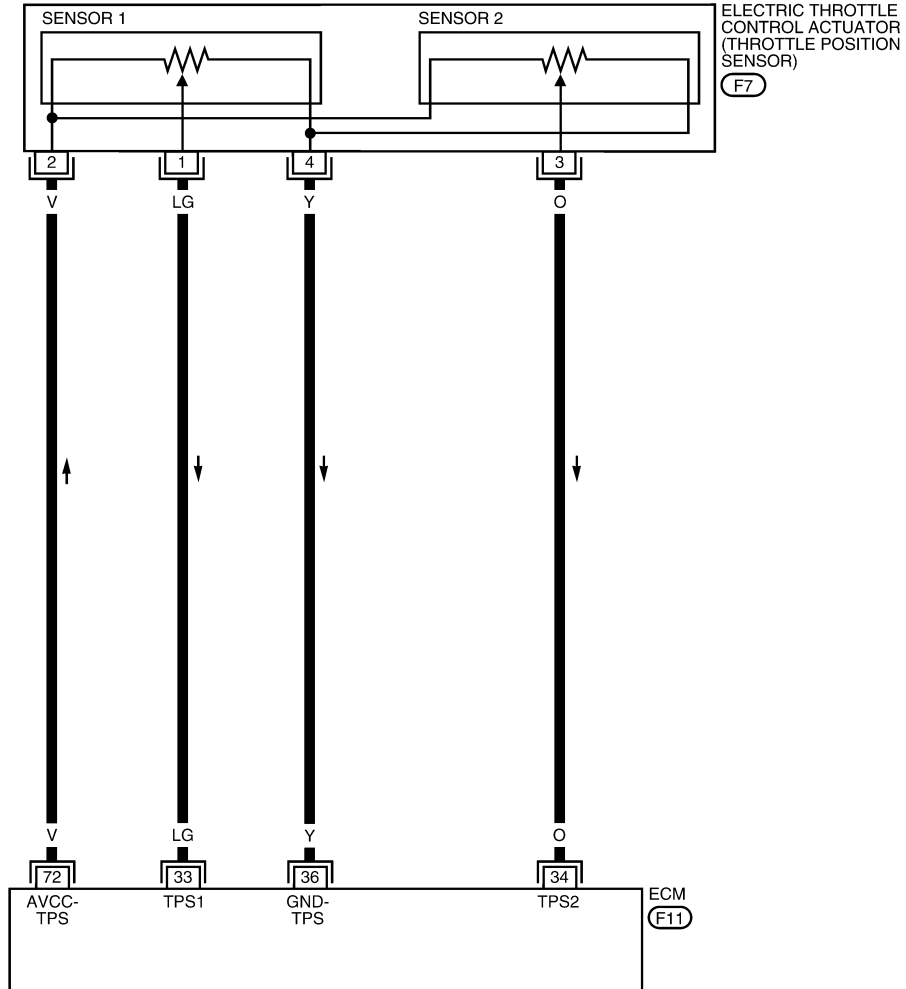
3. If DTC is detected, go to [EC-979. "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000005532874

EC-TPS3-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA2657E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

DTC P2135 TP SENSOR

[MR18DE]

< SERVICE INFORMATION >

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

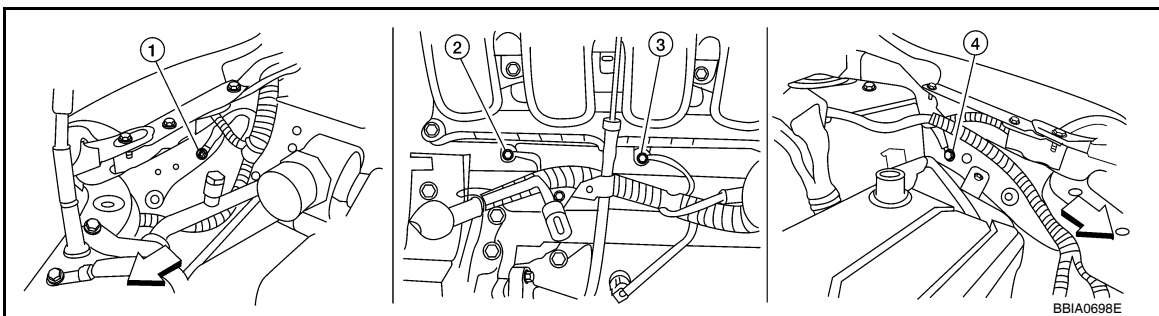
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	LG	Throttle position sensor 1	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36 V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75 V
34	O	Throttle position sensor 2	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75 V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36 V
36	Y	Sensor ground (Throttle position sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
72	V	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5 V

Diagnosis Procedure

INFOID:000000005532875

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
Refer to [EC-638, "Ground Inspection"](#).



↶ Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

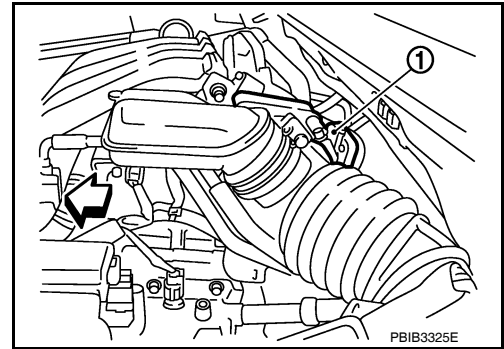
2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

DTC P2135 TP SENSOR

[MR18DE]

< SERVICE INFORMATION >

1. Disconnect electric throttle control actuator (1) harness connector.
 - ⇐: Vehicle front
2. Turn ignition switch ON.

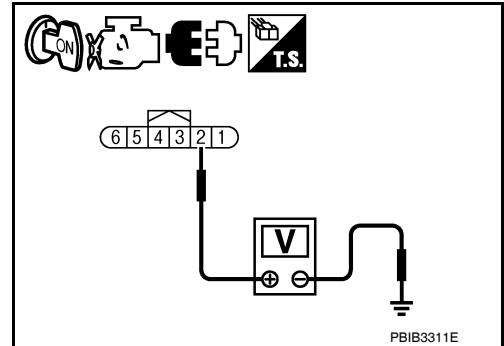


3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V

OK or NG

- OK >> GO TO 3.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 36. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 4.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following;
 - electric throttle control actuator terminal 1 and ECM terminal 33,
 - electric throttle control actuator terminal 3 and ECM terminal 34.Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to [EC-981, "Component Inspection"](#).

OK or NG

- OK >> GO TO 7.
- NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).

DTC P2135 TP SENSOR

[MR18DE]

< SERVICE INFORMATION >

3. Perform [EC-580, "Idle Air Volume Learning"](#).

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> INSPECTION END

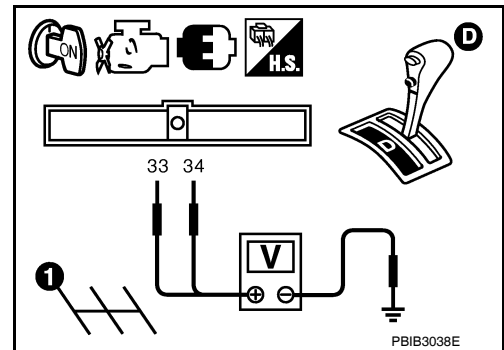
Component Inspection

INFOID:000000005532876

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
3. Turn ignition switch ON.
4. Set shift lever to D position (A/T, CVT) or 1st position (M/T).
5. Check voltage between ECM terminals 33 (TP sensor 1 signal), 34 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
33 (Throttle position sensor 1)	Fully released	More than 0.36 V
	Fully depressed	Less than 4.75 V
34 (Throttle position sensor 2)	Fully released	Less than 4.75 V
	Fully depressed	More than 0.36 V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
8. Perform [EC-580, "Idle Air Volume Learning"](#).

Removal and Installation

INFOID:000000005532877

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-137, "Removal and Installation"](#).

DTC P2138 APP SENSOR

< SERVICE INFORMATION >

[MR18DE]

DTC P2138 APP SENSOR

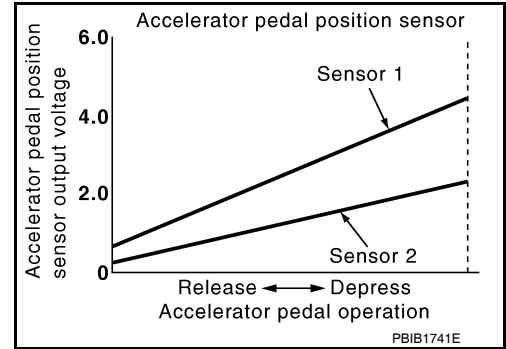
Component Description

INFOID:000000005532878

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532879

Specification data are reference values.

Monitor item	Condition	Specification
ACCEL SEN 1	• Ignition switch: ON (Engine stopped) Accelerator pedal: Fully released	0.6 - 0.9 V
	Accelerator pedal: Fully depressed	4.0 - 4.8 V
ACCEL SEN 2*	• Ignition switch: ON (Engine stopped) Accelerator pedal: Fully released	0.6 - 0.9 V
	Accelerator pedal: Fully depressed	3.9 - 4.8 V
CLSD THL POS	• Ignition switch: ON (Engine stopped) Accelerator pedal: Fully released	ON
	Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

INFOID:000000005532880

This self-diagnosis has the one trip detection logic.

NOTE:

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Refer to [EC-896](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138 2138	Accelerator pedal position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	<ul style="list-style-type: none"> Harness or connector (APP sensor 1 and 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Accelerator pedal position sensor (APP sensor 1 and 2) Crankshaft position sensor (POS) EVAP control system pressure sensor Refrigerant pressure sensor

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

DTC P2138 APP SENSOR

< SERVICE INFORMATION >

[MR18DE]

Engine operating condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:000000005532881

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-985, "Diagnosis Procedure"](#).

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

DTC P2138 APP SENSOR

< SERVICE INFORMATION >

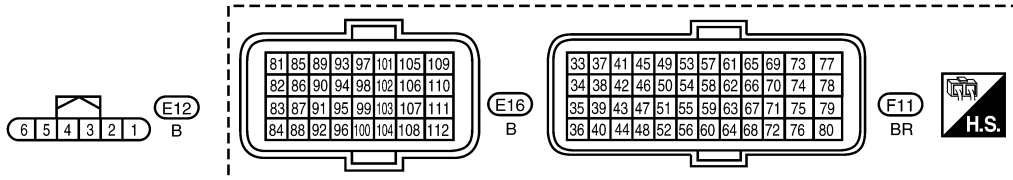
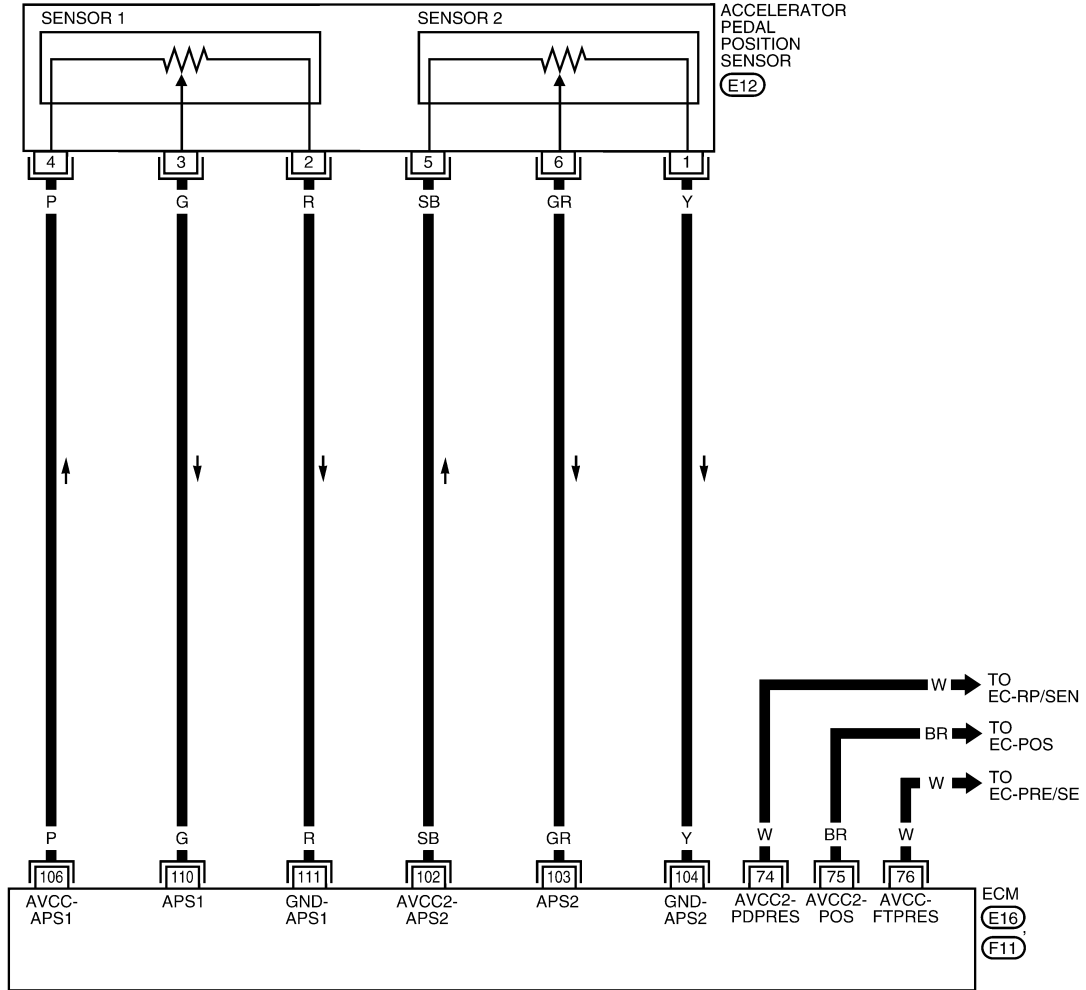
[MR18DE]

Wiring Diagram

INFOID:000000005532882

EC-APPS3-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA3075E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P2138 APP SENSOR

< SERVICE INFORMATION >

[MR18DE]

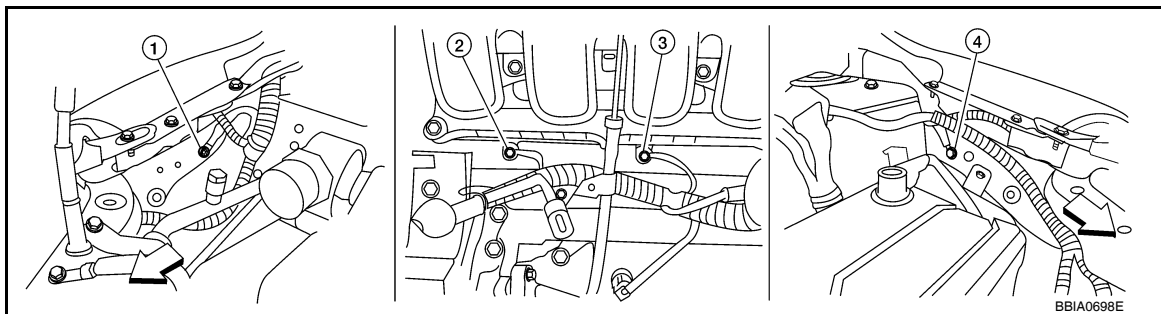
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	W	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	Approximately 5 V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	[Ignition switch: ON]	Approximately 5 V
76	W	EVAP control system pressure sensor power supply	[Ignition switch: ON]	Approximately 5 V
102	SB	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5 V
103	GR	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6 V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4 V
104	Y	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
106	P	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5 V
110	G	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9 V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7 V
111	R	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V

Diagnosis Procedure

INFOID:000000005532883

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
Refer to [EC-638, "Ground Inspection"](#).



↶ Vehicle front

1. Body ground E24
4. Body ground E15

2. Engine ground F9

3. Engine ground F16

DTC P2138 APP SENSOR

[MR18DE]

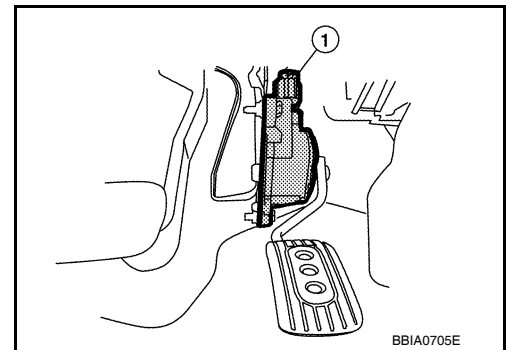
< SERVICE INFORMATION >

OK or NG

- OK >> GO TO 2.
- NG >> Repair or replace ground connections.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.

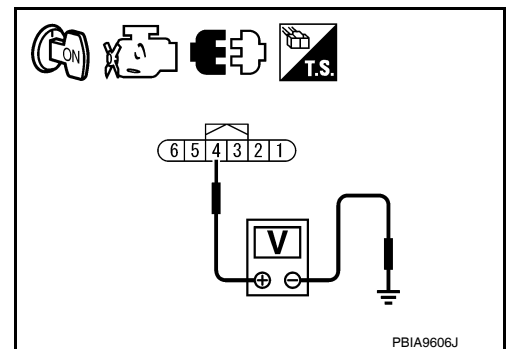


3. Check voltage between APP sensor terminal 4 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V

OK or NG

- OK >> GO TO 3.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.



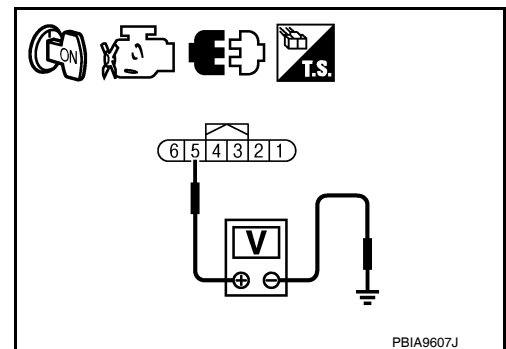
3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between APP sensor terminal 5 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V

OK or NG

- OK >> GO TO 7.
- NG >> GO TO 4.



4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 5 and ECM terminal 102. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

- OK >> GO TO 5.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK COMPONENTS POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

DTC P2138 APP SENSOR

[MR18DE]

< SERVICE INFORMATION >

ECM terminal	Sensor terminal	Reference Wiring Diagram
74	Refrigerant pressure sensor terminal 3	EC-1029, "Wiring Diagram"
75	Crankshaft position sensor (POS) terminal 1	EC-794, "Wiring Diagram"
76	EVAP control system pressure sensor terminal 3	EC-853, "Wiring Diagram"
102	APP sensor terminal 5	EC-984, "Wiring Diagram"

OK or NG

- OK >> GO TO 6.
NG >> Repair short to ground or short to power in harness or connectors.

6.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to [EC-798, "Component Inspection"](#).)
- EVAP control system pressure sensor (Refer to [EC-850, "Component Inspection"](#).)
- Refrigerant pressure sensor (Refer to [MTC-38](#).)

OK or NG

- OK >> GO TO 11.
NG >> Replace malfunctioning component.

7.CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following;
ECM terminal 111 and APP sensor terminal 2,
ECM terminal 104 and APP sensor terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following;
ECM terminal 110 and APP sensor terminal 3,
ECM terminal 103 and APP sensor terminal 6.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK APP SENSOR

Refer to [EC-988, "Component Inspection"](#).

OK or NG

- OK >> GO TO 11.
NG >> GO TO 10.

10.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-580, "Idle Air Volume Learning"](#).

>> INSPECTION END

11. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> INSPECTION END

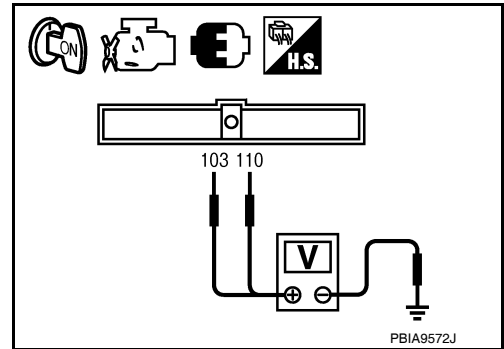
Component Inspection

INFOID:000000005532884

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 110 (APP sensor 1 signal), 103 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
110 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.9 V
	Fully depressed	3.9 - 4.7 V
103 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.6 V
	Fully depressed	1.95 - 2.4 V



PBIA9572J

4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform [EC-580, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-580, "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-580, "Idle Air Volume Learning"](#).

Removal and Installation

INFOID:000000005532885

ACCELERATOR PEDAL

Refer to [ACC-4](#).

DTC P2A00 A/F SENSOR 1

< SERVICE INFORMATION >

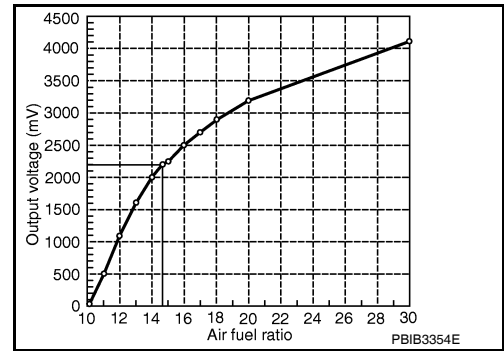
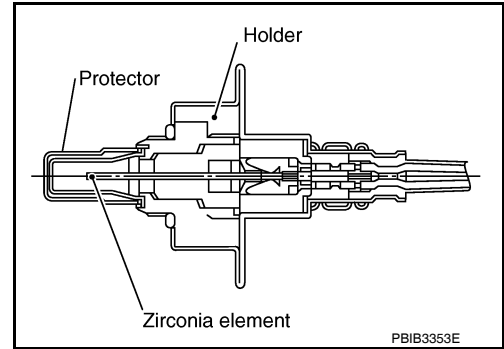
[MR18DE]

DTC P2A00 A/F SENSOR 1

Component Description

INFOID:000000005532886

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element. The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range. The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich. Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532887

Specification data are reference values.

Monitor item	Condition	Specification
A/F SEN1 (B1)	<ul style="list-style-type: none"> Engine: After warming up Maintaining engine speed at 2,000 rpm 	Fluctuates around 2.2 V

On Board Diagnosis Logic

INFOID:000000005532888

To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored not to be shifted to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P2A00 2A00	Air fuel ratio (A/F) sensor 1 circuit range/performance	<ul style="list-style-type: none"> The output voltage computed by ECM from the A/F sensor 1 signal is shifted to the lean side for a specified period. The A/F signal computed by ECM from the A/F sensor 1 signal is shifted to the rich side for a specified period. 	<ul style="list-style-type: none"> Air fuel ratio (A/F) sensor 1 Air fuel ratio (A/F) sensor 1 heater Fuel pressure Fuel injector Intake air leaks

DTC Confirmation Procedure

INFOID:000000005532889

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.

DTC P2A00 A/F SENSOR 1

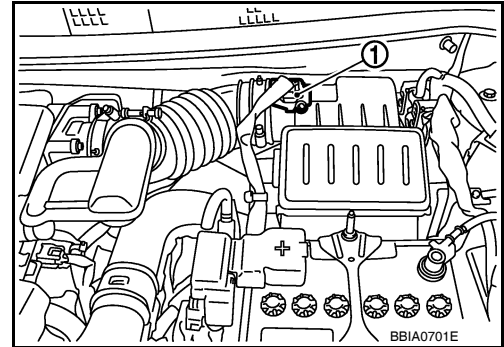
[MR18DE]

< SERVICE INFORMATION >

3. Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
4. Clear the self-learning coefficient by touching "CLEAR".
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
7. Let engine idle for 1 minute.
8. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
9. Check 1st trip DTC.
10. If 1st trip DTC is detected, go to [EC-992. "Diagnosis Procedure"](#).

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector.
4. Start engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor (1) harness connector.
6. Select Service \$03 with GST and make sure that DTC P0102 is detected.
7. Select Service \$04 with GST and erase the DTC P0102.
8. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
9. Let engine idle for 1 minute.
10. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
11. Select Service \$07 with GST.
If 1st trip DTC is detected, go to [EC-992. "Diagnosis Procedure"](#).



DTC P2A00 A/F SENSOR 1

< SERVICE INFORMATION >

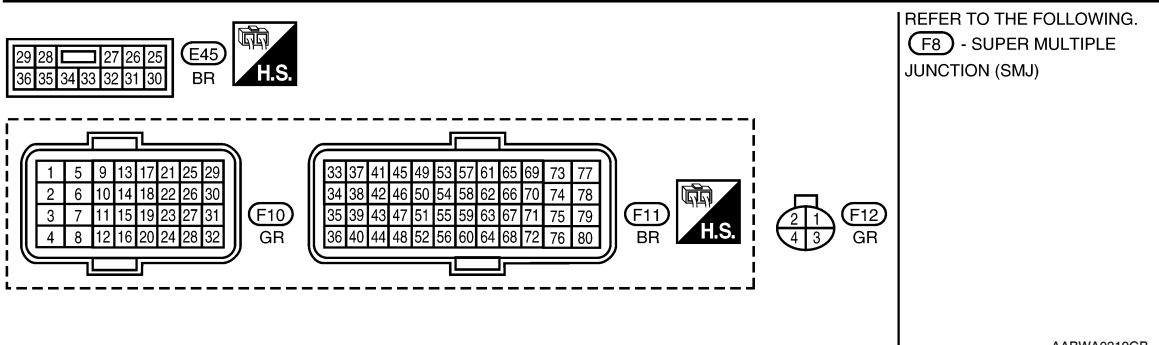
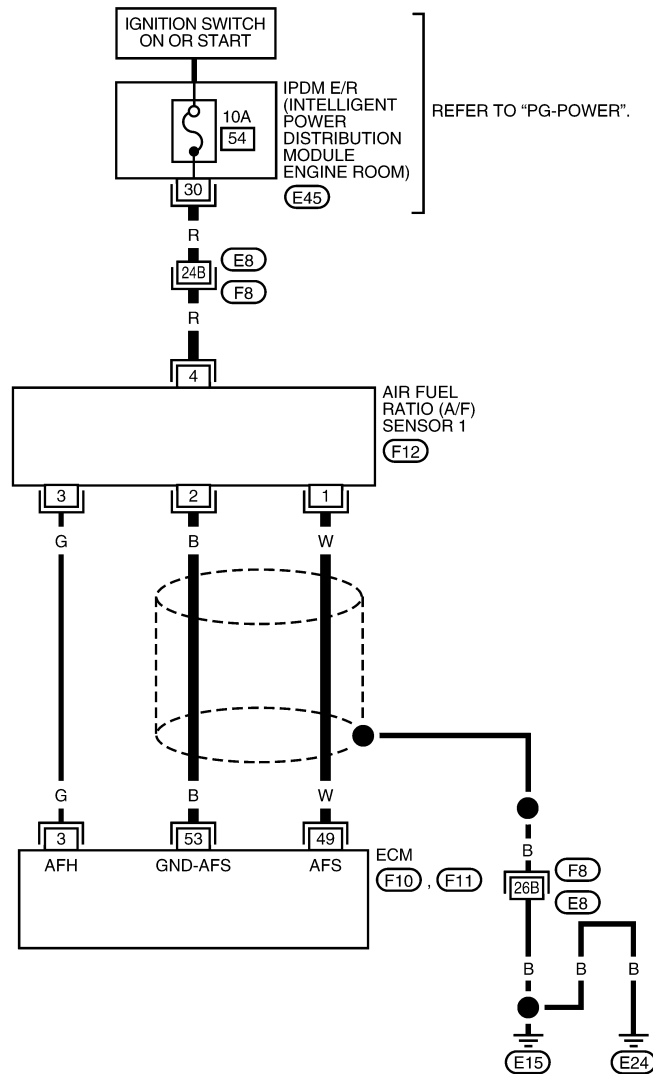
[MR18DE]

INFOID:000000005532890

Wiring Diagram

EC-A/F-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



AABWA0319GB

Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT-III.

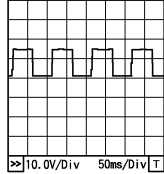
CAUTION:

DTC P2A00 A/F SENSOR 1

[MR18DE]

< SERVICE INFORMATION >

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8 V★  PBIAB148J
49	W	A/F sensor 1	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 1.8 V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	[Ignition switch: ON]	Approximately 2.2 V

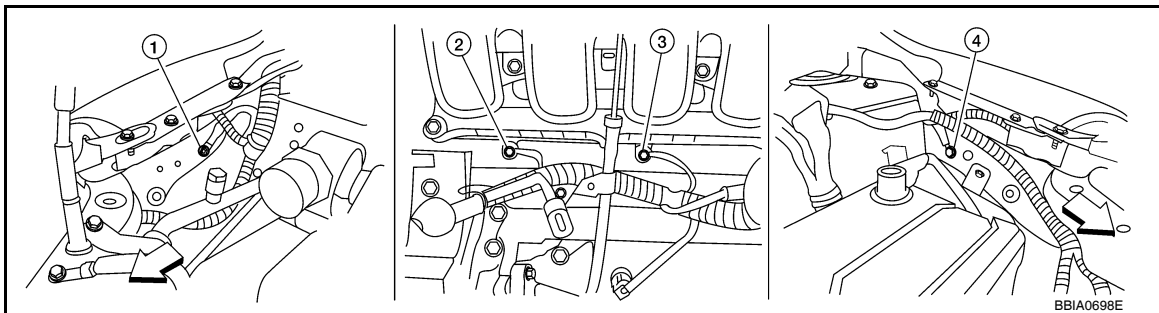
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005532891

1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body.
Refer to [EC-638, "Ground Inspection"](#).



↙: Vehicle front

- Body ground E24
- Engine ground F9
- Engine ground F16
- Body ground E15

OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace ground connections.

2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1. Refer to [EM-140, "Removal and Installation"](#).

>> GO TO 3.

3. CHECK FOR INTAKE AIR LEAK

- Start engine and run it at idle.
- Listen for an intake air leak after the mass air flow sensor.

OK or NG

- OK >> GO TO 4.
 NG >> Repair or replace.

DTC P2A00 A/F SENSOR 1

[MR18DE]

< SERVICE INFORMATION >

4. CLEAR THE SELF-LEARNING DATA

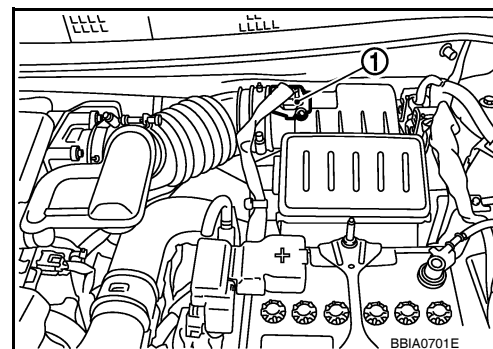
④ With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.

**Is the 1st trip DTC P0171 and P0172 detected?
Is it difficult to start engine?**

⊗ Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
 2. Turn ignition switch OFF.
 3. Disconnect mass air flow sensor (1) harness connector.
 4. Restart engine and let it idle for at least 5 seconds.
 5. Stop engine and reconnect mass air flow sensor harness connector.
 6. Make sure DTC P0102 is displayed.
 7. Erase the DTC memory. Refer to [EC-542. "Emission-related Diagnostic Information"](#).
 8. Make sure DTC P0000 is displayed.
 9. Run engine for at least 10 minutes at idle speed.
- Is the 1st trip DTC P0171 and P0172 detected?
Is it difficult to start engine?**



Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to [EC-758](#) or [EC-764](#).
No >> GO TO 5.

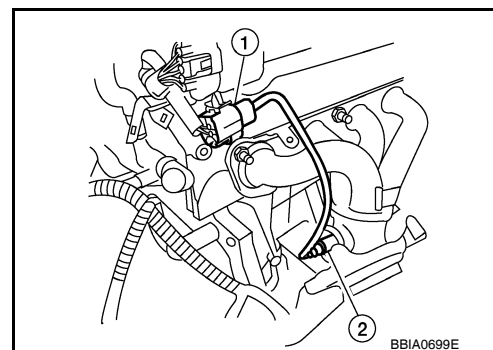
5. CHECK HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector (1).
 - Air fuel ratio (A/F) sensor (2)
3. Check harness connector for water.

Water should no exist.

OK or NG

- OK >> GO TO 6.
NG >> Repair or replace harness connector.



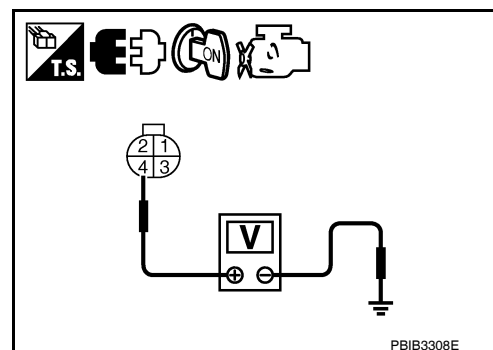
6. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 8.
NG >> GO TO 7.



7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8

DTC P2A00 A/F SENSOR 1

[MR18DE]

< SERVICE INFORMATION >

- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

4. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK A/F SENSOR 1 HEATER

Refer to [EC-652. "Component Inspection"](#).

OK or NG

OK >> GO TO 10.

NG >> GO TO 11.

10. CHECK INTERMITTENT INCIDENT

Perform [EC-632](#).

OK or NG

OK >> GO TO 11.

NG >> Repair or replace.

11. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> GO TO 12.

12. CONFIRM A/F ADJUSTMENT DATA

1. Turn ignition switch ON.
2. Select "A/F ADJ-B1" in "DATA MONITOR" mode with CONSULT-III.
3. Make sure that "0.000" is displayed on CONSULT-III screen.

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 13.

13. CLEAR THE SELF-LEARNING DATA

 With CONSULT-III

DTC P2A00 A/F SENSOR 1

[MR18DE]

< SERVICE INFORMATION >

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching "CLEAR".

⊗ Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness (1) connector.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to [EC-542, "Emission-related Diagnostic Information"](#).
8. Make sure DTC P0000 is displayed.

>> GO TO 14.

14. CONFIRM A/F ADJUSTMENT DATA

1. Turn ignition switch OFF and then ON.
2. Select "A/F ADJ-B1" in "DATA MONITOR" mode with CONSULT-III.
3. Make sure that "0.000" is displayed on CONSULT-III screen.

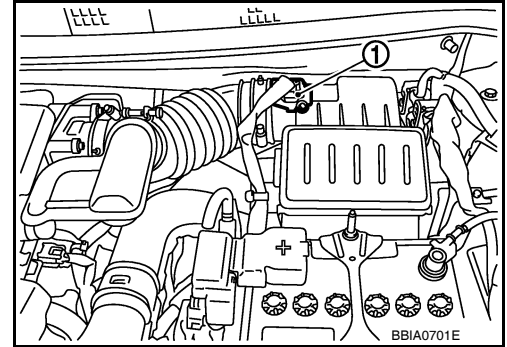
>> INSPECTION END

Removal and Installation

INFOID:000000005532892

AIR FUEL RATIO SENSOR HEATER

Refer to [EM-140, "Removal and Installation"](#).



ASCD BRAKE SWITCH

< SERVICE INFORMATION >

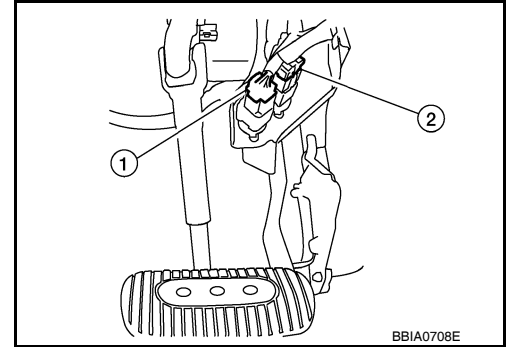
[MR18DE]

ASCD BRAKE SWITCH

Component Description

INFOID:000000005532893

When depress on the brake pedal, ASCD brake switch (2) is turned OFF and stop lamp switch (1) is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal)
Refer to [EC-522](#) for the ASCD function.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532894

Specification data are reference values.

Monitor item	Condition	Specification	
BRAKE SW1 (ASCD brake switch)	• Ignition switch: ON	• Brake pedal: Fully released (A/T, CVT) • Brake pedal and clutch pedal: Fully released (M/T)	ON
		• Brake pedal: Slightly depressed (A/T, CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	OFF
BRAKE SW2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

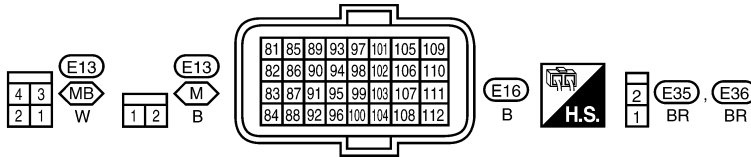
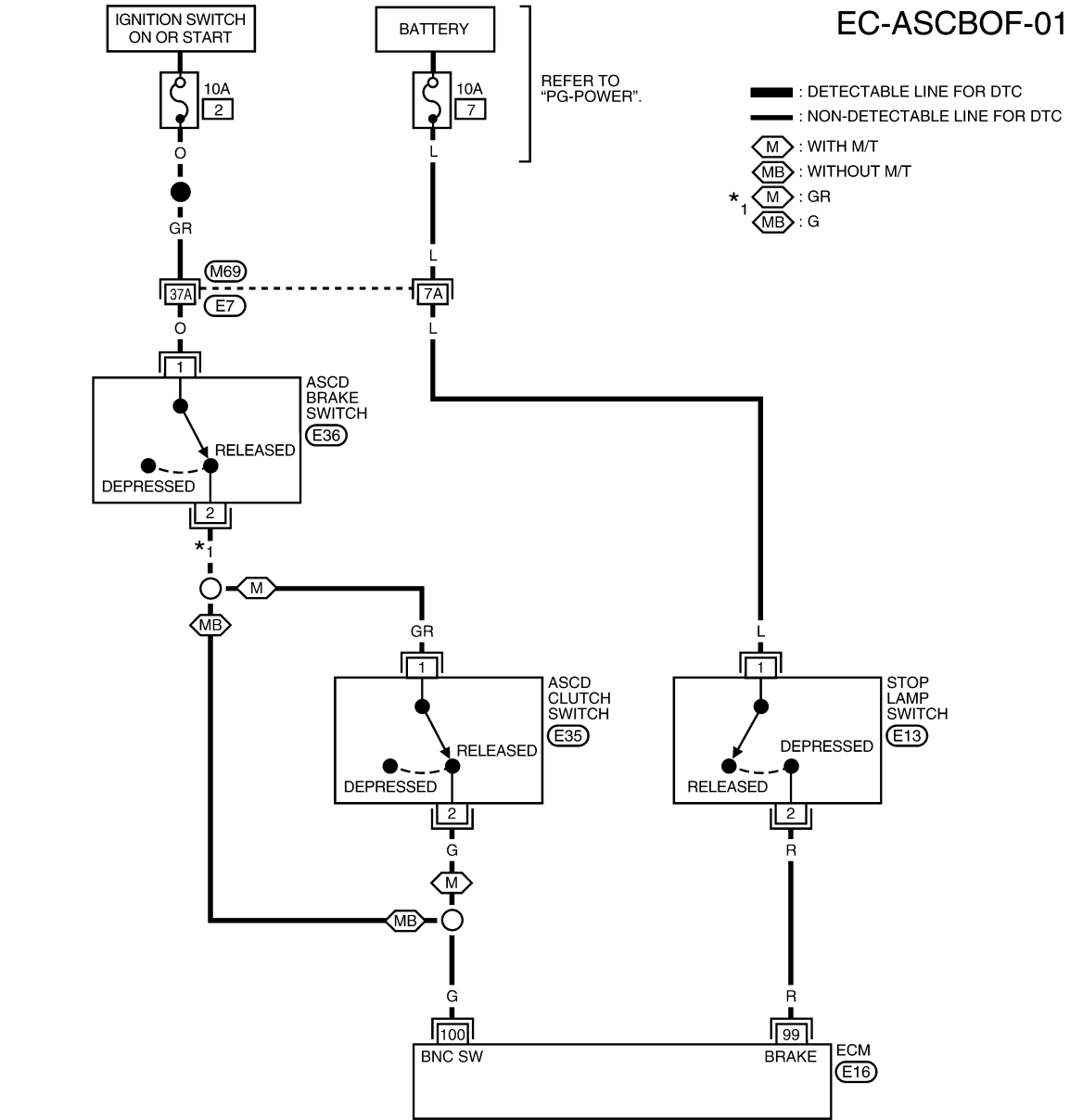
ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[MR18DE]

Wiring Diagram

INFOID:000000005532895



REFER TO THE FOLLOWING.
(M69) - SUPER MULTIPLE JUNCTION (SMJ)

ABBWA0430GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[MR18DE]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
99	R	Stop lamp switch	[Ignition switch: ON] • Brake pedal: Fully released	Approximately 0 V
			[Ignition switch: ON] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)
100	G	ASCD brake switch	[Ignition switch: ON] • Brake pedal: Slightly depressed (A/T, CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	Approximately 0 V
			[Ignition switch: ON] • Brake pedal: Fully released (A/T, CVT) • Brake pedal and clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14 V)

Diagnosis Procedure

INFOID:000000005532896

1. CHECK OVERALL FUNCTION-I

With CONSULT-III

- Turn ignition switch ON.
- Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.
- Check "BRAKE SW1" indication under the following conditions.

M/T models

Condition	Indication
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON

A/T and CVT models

Condition	Indication
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON

Without CONSULT-III

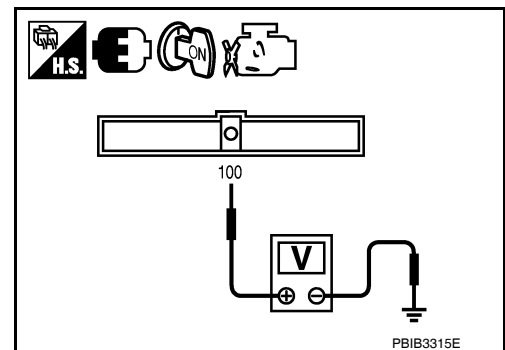
- Turn ignition switch ON.
- Check voltage between ECM terminal 100 and ground under the following conditions.

M/T models

Condition	Voltage
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0 V
Clutch pedal and brake pedal: Fully released	Battery voltage

A/T and CVT models

Condition	Voltage
Brake pedal: Slightly depressed	Approximately 0 V
Brake pedal: Fully released	Battery voltage



OK or NG

- OK >> GO TO 2.
- NG (M/T models) >>>GO TO 3.
- NG (A/T and CVT models) >>>GO TO 4.

2. CHECK OVERALL FUNCTION-II

With CONSULT-III

Check "BRAKE SW2" indication in "DATA MONITOR" mode.

ASCD BRAKE SWITCH

[MR18DE]

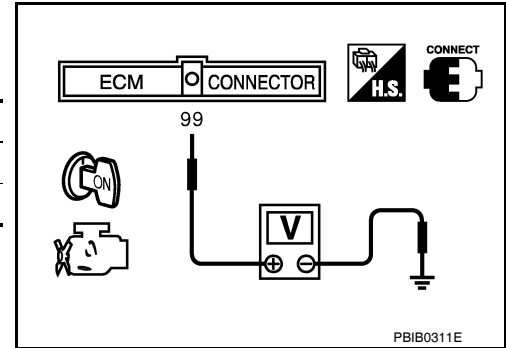
< SERVICE INFORMATION >

Condition	Indication
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

Without CONSULT-III

Check voltage between ECM terminal 99 and ground under the following conditions.

Condition	Voltage
Brake pedal: Fully released	Approximately 0 V
Brake pedal: Slightly depressed	Battery voltage

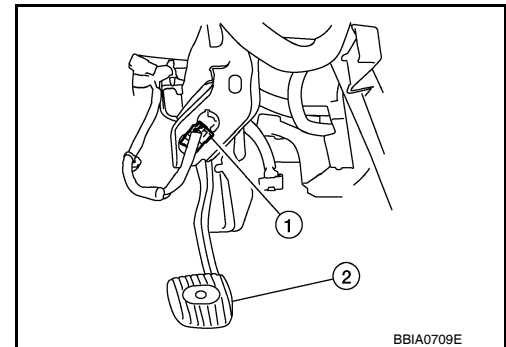


OK or NG

- OK >> INSPECTION END.
- NG >> GO TO 11.

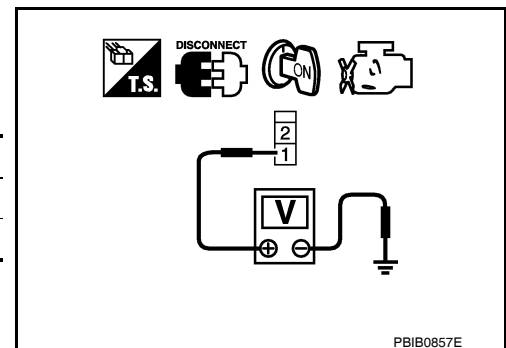
3. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch (1) harness connector.
 - Clutch pedal (2)
3. Turn ignition switch ON.



4. Check voltage between ASCD clutch switch terminal 1 and ground under the following conditions with CONSULT-III or tester.

Condition	Voltage
Brake pedal: Fully released	Battery voltage
Brake pedal: Slightly depressed	Approx. 0 V



OK or NG

- OK >> GO TO 9.
- NG >> GO TO 4.

4. CHECK ASCD BRAKE SWITCH POWER SUPPLY

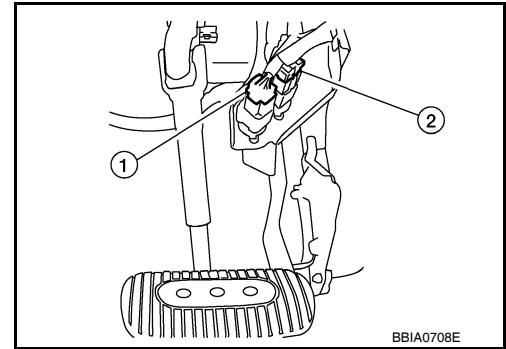
1. Turn ignition switch OFF.

ASCD BRAKE SWITCH

[MR18DE]

< SERVICE INFORMATION >

2. Disconnect ASCD brake switch (2) harness connector.
 - Stop lamp switch (1)
3. Turn ignition switch ON.

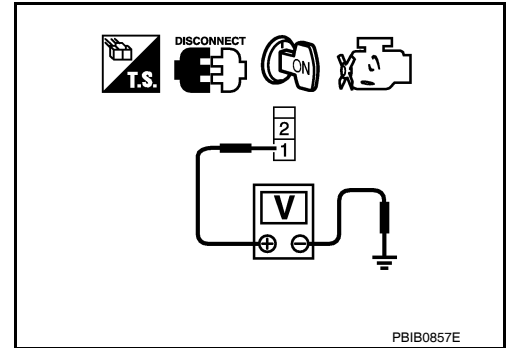


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK (M/T models) >>GO TO 6.
- OK (A/T and CVT models) >>GO TO 7.
- NG >> GO TO 5.



5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M69, E7
- 10 A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 8.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 100 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 8.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK ASCD BRAKE SWITCH

Refer to [EC-938. "Component Inspection"](#).

ASCD BRAKE SWITCH

[MR18DE]

< SERVICE INFORMATION >

OK or NG

- OK >> GO TO 15.
- NG >> Replace ASCD brake switch.

9. CHECK ASCD CLUTCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 100 and ASCD clutch switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 10.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ASCD CLUTCH SWITCH

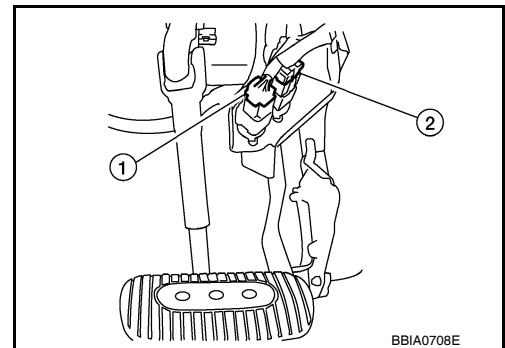
Refer to [EC-938, "Component Inspection"](#)

OK or NG

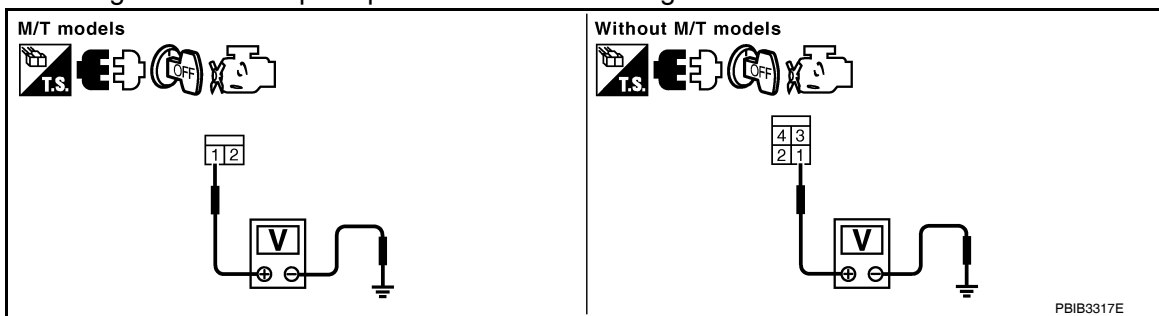
- OK >> GO TO 15.
- NG >> Replace ASCD clutch switch.

11. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch (1) harness connector.
 - ASCD brake switch (2)



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

- OK >> GO TO 13.
- NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M69, E7
- 10 A fuse

ASCD BRAKE SWITCH

[MR18DE]

< SERVICE INFORMATION >

- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 99 and stop lamp switch terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK STOP LAMP SWITCH

Refer to [EC-938, "Component Inspection"](#).

OK or NG

OK >> GO TO 15.

NG >> Replace stop lamp switch.

15. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

Component Inspection

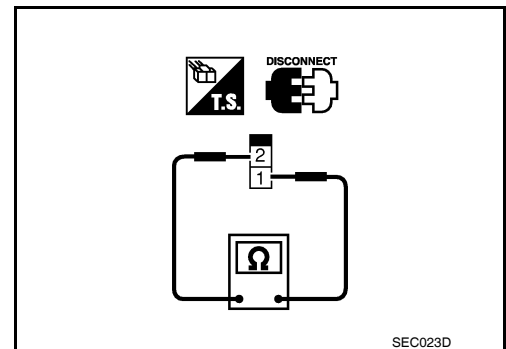
INFOID:000000005532897

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released.	Should exist.
Brake pedal: Slightly depressed.	Should not exist.

If NG, adjust ASCD brake switch installation, refer to [BR-6](#), and perform step 3 again.



ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.

ASCD BRAKE SWITCH

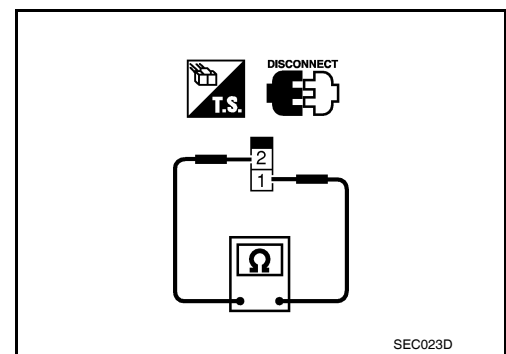
[MR18DE]

< SERVICE INFORMATION >

- Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

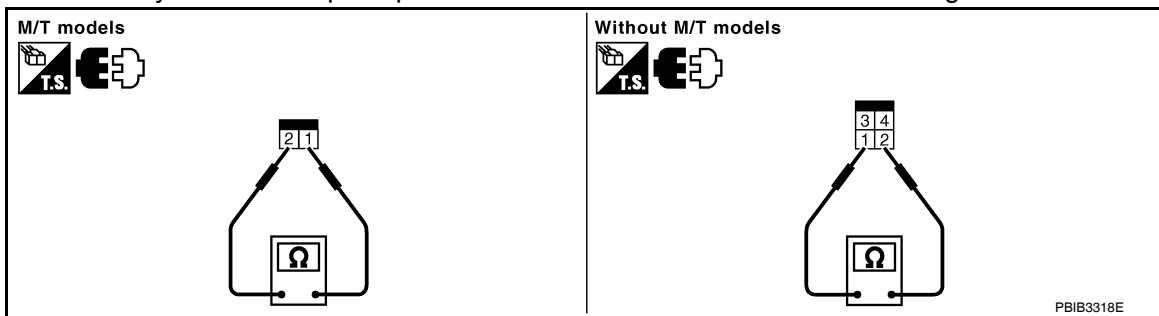
Condition	Continuity
Clutch pedal: Fully released.	Should exist.
Clutch pedal: Slightly depressed.	Should not exist.

If NG, adjust ASCD clutch switch installation, refer to [CL-6](#), and perform step 3 again.



STOP LAMP SWITCH

- Turn ignition switch OFF.
- Disconnect stop lamp switch harness connector.
- Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released.	Should not exist.
Brake pedal: Slightly depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to [BR-6](#), and perform step 3 again.

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

ASCD INDICATOR

< SERVICE INFORMATION >

[MR18DE]

ASCD INDICATOR

Component Description

INFOID:000000005532898

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.

CRUISE indicator illuminates when MAIN switch on ASCD steering switch is turned ON to indicate that ASCD system is ready for operation.

SET indicator illuminates when following conditions are met.

- CRUISE indicator is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET indicator remains lit during ASCD control.

Refer to [EC-522](#) for the ASCD function.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532899

Specification data are reference value.

Monitor item	Condition		Specification
CRUISE LAMP	• Ignition switch: ON	MAIN switch: Pressed at 1st time → 2nd	ON → OFF
SET LAMP	• MAIN switch: ON • Vehicle: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

ASC D INDICATOR

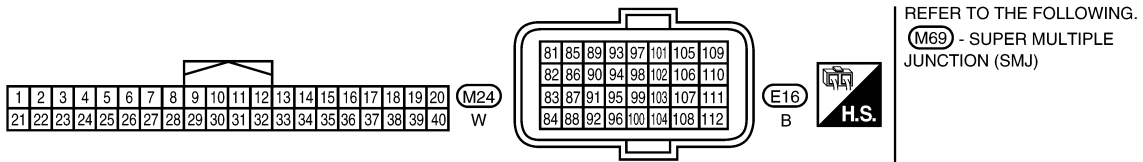
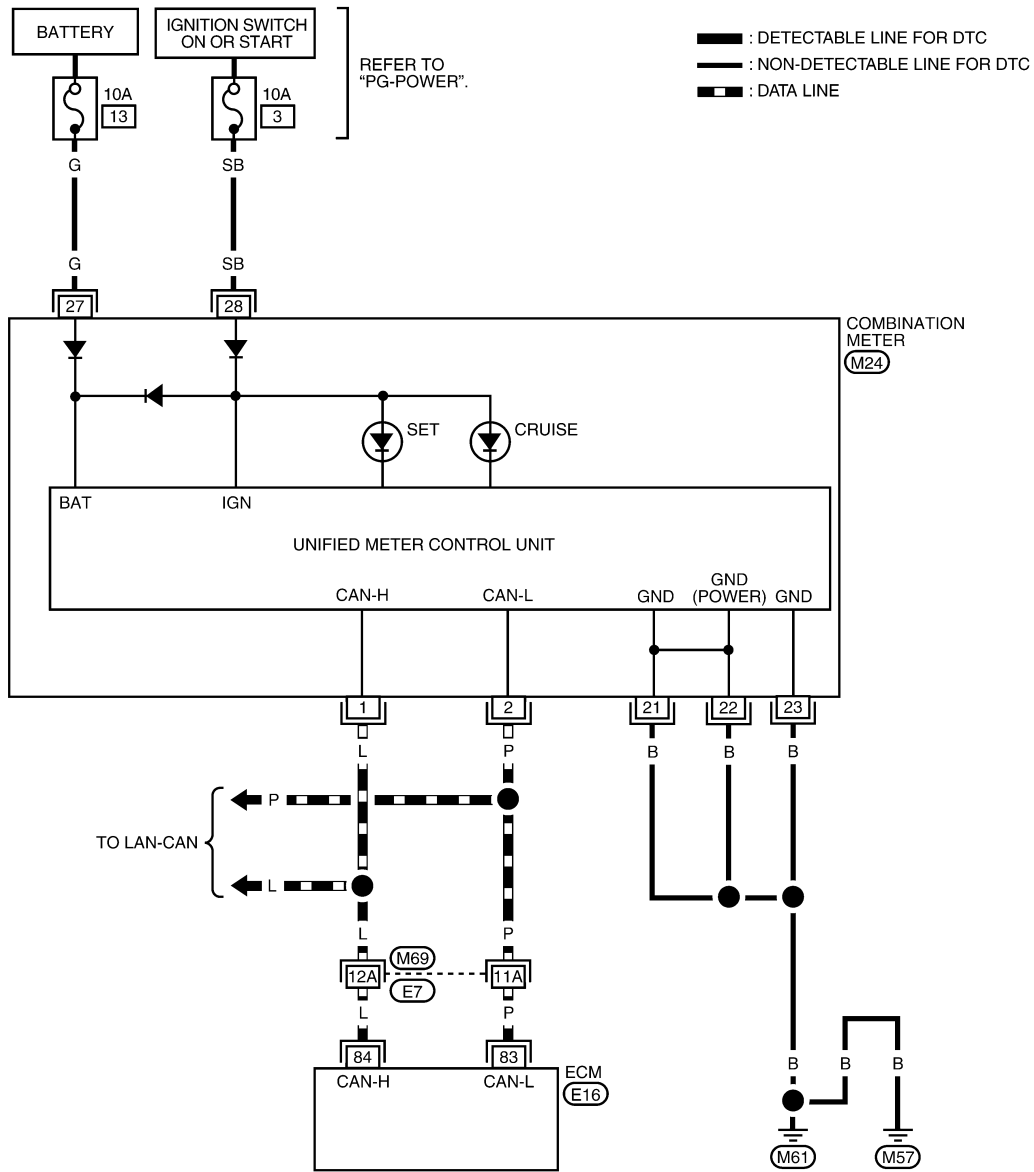
< SERVICE INFORMATION >

[MR18DE]

Wiring Diagram

INFOID:000000005532900

EC-ASCIND-01



AABWA0231GB

Diagnosis Procedure

INFOID:000000005532901

1. CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR

[MR18DE]

< SERVICE INFORMATION >

ASCD Indicator	Condition		Specification
CRUISE LAMP	• Ignition switch: ON	MAIN switch: Pressed at 1st time → 2nd	ON → OFF
SET LAMP	• MAIN switch: ON • Vehicle: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 2.

2.CHECK DTC

Check that DTC UXXXX is not displayed.

Yes or No

Yes >> Perform trouble diagnoses for DTC UXXXX.

No >> GO TO 3.

3.CHECK COMBINATION METER OPERATION

Does combination meter operate normally?

Yes or No

Yes >> GO TO 4.

No >> Check combination meter circuit. Refer to [DI-4](#).

4.CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

ELECTRICAL LOAD SIGNAL

< SERVICE INFORMATION >

[MR18DE]

ELECTRICAL LOAD SIGNAL

CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532902

Specification data are reference values.

Monitor item	Condition	Specification	
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd position.	ON
		Rear window defogger switch is OFF and lighting switch is OFF.	OFF
HEATER FAN SW	• Ignition switch: ON	Heater fan: Operating.	ON
		Heater fan: Not operating.	OFF

Diagnosis Procedure

INFOID:000000005532903

1. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

1. Turn ignition switch ON.
2. Check "LOAD SIGNAL" in "DATA MONITOR" mode with CONSULT-III under the following conditions.

Condition	LOAD SIGNAL
Lighting switch: ON at 2nd position	ON
Lighting switch: OFF	OFF

OK or NG

- OK >> GO TO 2.
NG >> GO TO 4.

2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Check "LOAD SIGNAL" in "DATA MONITOR" mode with CONSULT-III under the following conditions.

Condition	LOAD SIGNAL
Rear window defogger switch: ON	ON
Rear window defogger switch: OFF	OFF

OK or NG

- OK >> GO TO 3.
NG >> GO TO 5.

3. CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

Check "HEATER FAN SW" in "DATA MONITOR" mode with CONSULT-III under the following conditions.

Condition	HEATER FAN SW
Heater fan control switch: ON	ON
Heater fan control switch: OFF	OFF

OK or NG

- OK >> **INSPECTION END.**
NG >> GO TO 6.

4. CHECK HEADLAMP SYSTEM

Refer to [LT-6](#) or [LT-28](#).

>> **INSPECTION END**

5. CHECK REAR WINDOW DEFOGGER SYSTEM

ELECTRICAL LOAD SIGNAL

< SERVICE INFORMATION >

[MR18DE]

Refer to [GW-51. "Component Parts and Harness Connector Location"](#).

>> INSPECTION END

6.CHECK HEATER FAN CONTROL SYSTEM

Refer to [MTC-22. "CONSULT-III Function \(BCM\)"](#).

>> INSPECTION END

FUEL INJECTOR

< SERVICE INFORMATION >

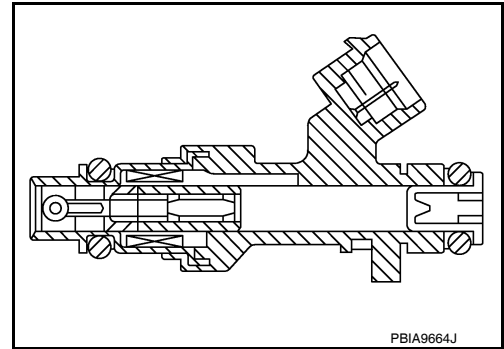
[MR18DE]

FUEL INJECTOR

Component Description

INFOID:000000005532904

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532905

Specification data are reference values.

Monitor item	Condition	Specification
B/FUEL SCHDL	See EC-624 .	
INJ PULSE-B1	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle
	2,000 rpm	2.0 - 3.0 msec 1.9 - 2.9 msec

FUEL INJECTOR

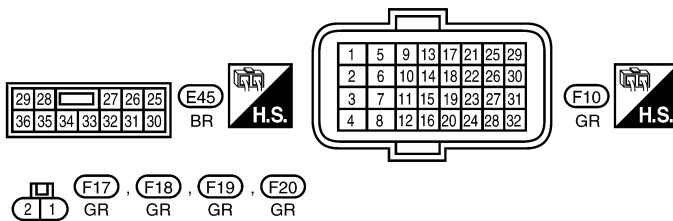
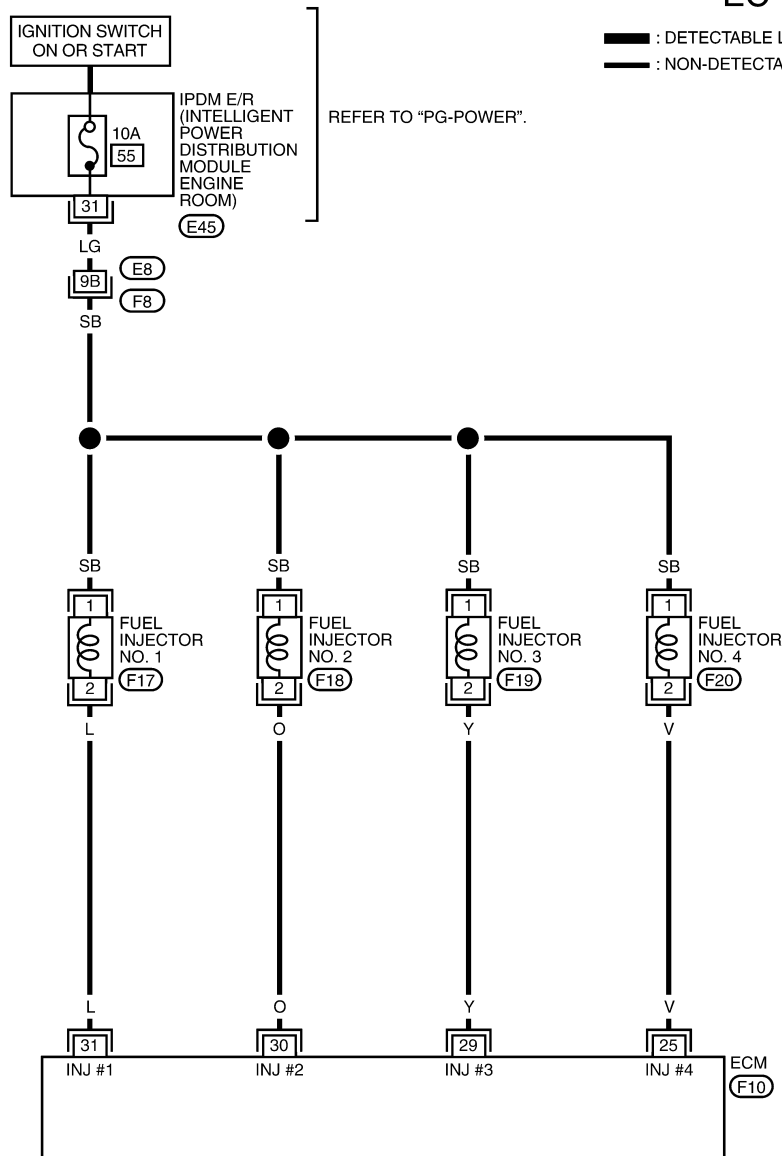
< SERVICE INFORMATION >

[MR18DE]

Wiring Diagram

INFOID:000000005532906

EC-INJECT-01



REFER TO THE FOLLOWING.

(F8) - SUPER MULTIPLE JUNCTION (SMJ)

BBWA3003E

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

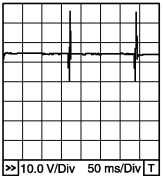
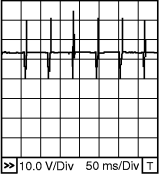
CAUTION:

FUEL INJECTOR

< SERVICE INFORMATION >

[MR18DE]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25 29 30 31	V Y O L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	<p>[Engine is running]</p> <ul style="list-style-type: none"> • Warm-up condition • Idle speed <p>NOTE: The pulse cycle changes depending on rpm at idle</p>	<p>BATTERY VOLTAGE (11 - 14 V)★</p>  <p>PBIB0529E</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> • Warm-up condition • Engine speed: 2,000 rpm 	<p>BATTERY VOLTAGE (11 - 14 V)★</p>  <p>PBIA4943J</p>

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005532907

1. INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

Yes or No

Yes >> GO TO 2.

No >> GO TO 3.

2. CHECK OVERALL FUNCTION

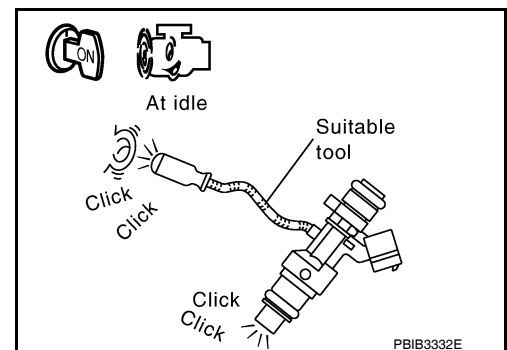
With CONSULT-III

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-III

1. Start engine.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



OK or NG

OK >> **INSPECTION END**

NG >> GO TO 3.

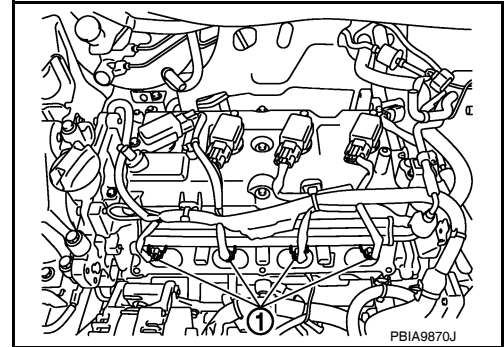
FUEL INJECTOR

[MR18DE]

< SERVICE INFORMATION >

3. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector (1) harness connector.
3. Turn ignition switch ON.

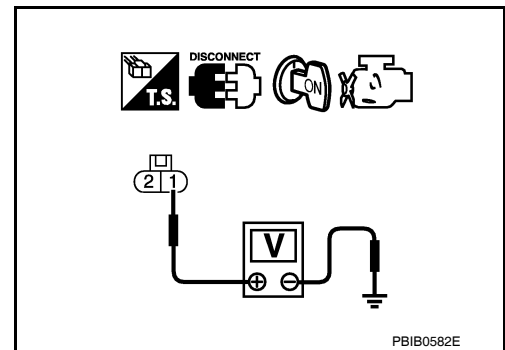


4. Check voltage between fuel injector terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- IPDM E/R harness connector E45
- 10 A fuse
- Harness for open or short between fuel injector and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between fuel injector terminal 2 and ECM terminals 25, 29, 30, 31. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK FUEL INJECTOR

Refer to [EC-1013, "Component Inspection"](#).

OK or NG

- OK >> GO TO 7.
NG >> Replace fuel injector.

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

FUEL INJECTOR

< SERVICE INFORMATION >

[MR18DE]

>> INSPECTION END

Component Inspection

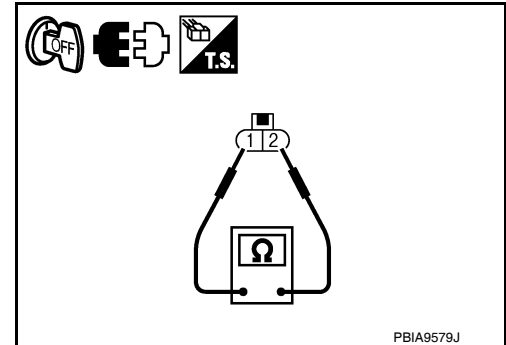
INFOID:000000005532908

FUEL INJECTOR

1. Disconnect fuel injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 11.1 - 14.5 Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel injector.



INFOID:000000005532909

Removal and Installation

FUEL INJECTOR

Refer to [EM-152](#).

FUEL PUMP

< SERVICE INFORMATION >

[MR18DE]

FUEL PUMP

Description

INFOID:000000005532910

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay
Battery	Battery voltage*		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.

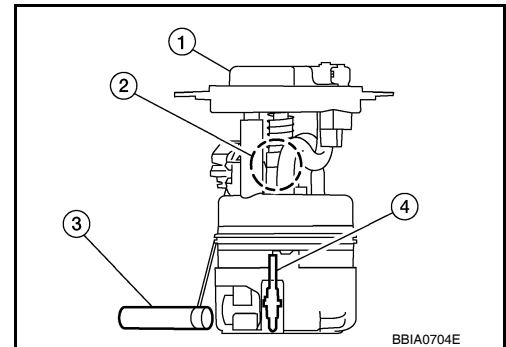
The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine start ability. If the ECM receives a engine speed signal from the crankshaft position sensor (POS) and camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON	Operates for 1 second
Engine running and cranking	Operates
Engine: Stopped	Stops in 1.5 seconds
Except as shown above	Stops

COMPONENT DESCRIPTION

A turbine type design fuel pump is used in the fuel tank.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel level sensor (3)
- Fuel tank temperature sensor (4)



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000005532911

Specification data are reference values.

Monitor item	Condition	Specification
FUEL PUMP RLY	<ul style="list-style-type: none"> • For 1 second after turning ignition switch ON • Engine running or cranking 	ON
	<ul style="list-style-type: none"> • Except above conditions 	OFF

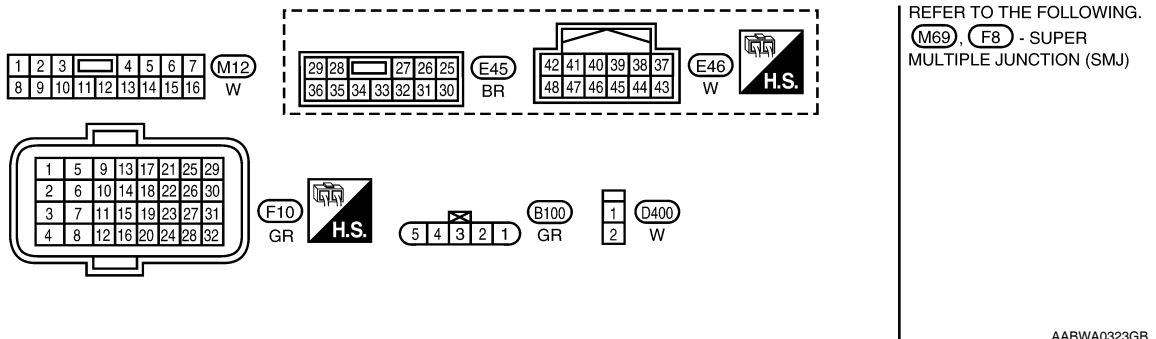
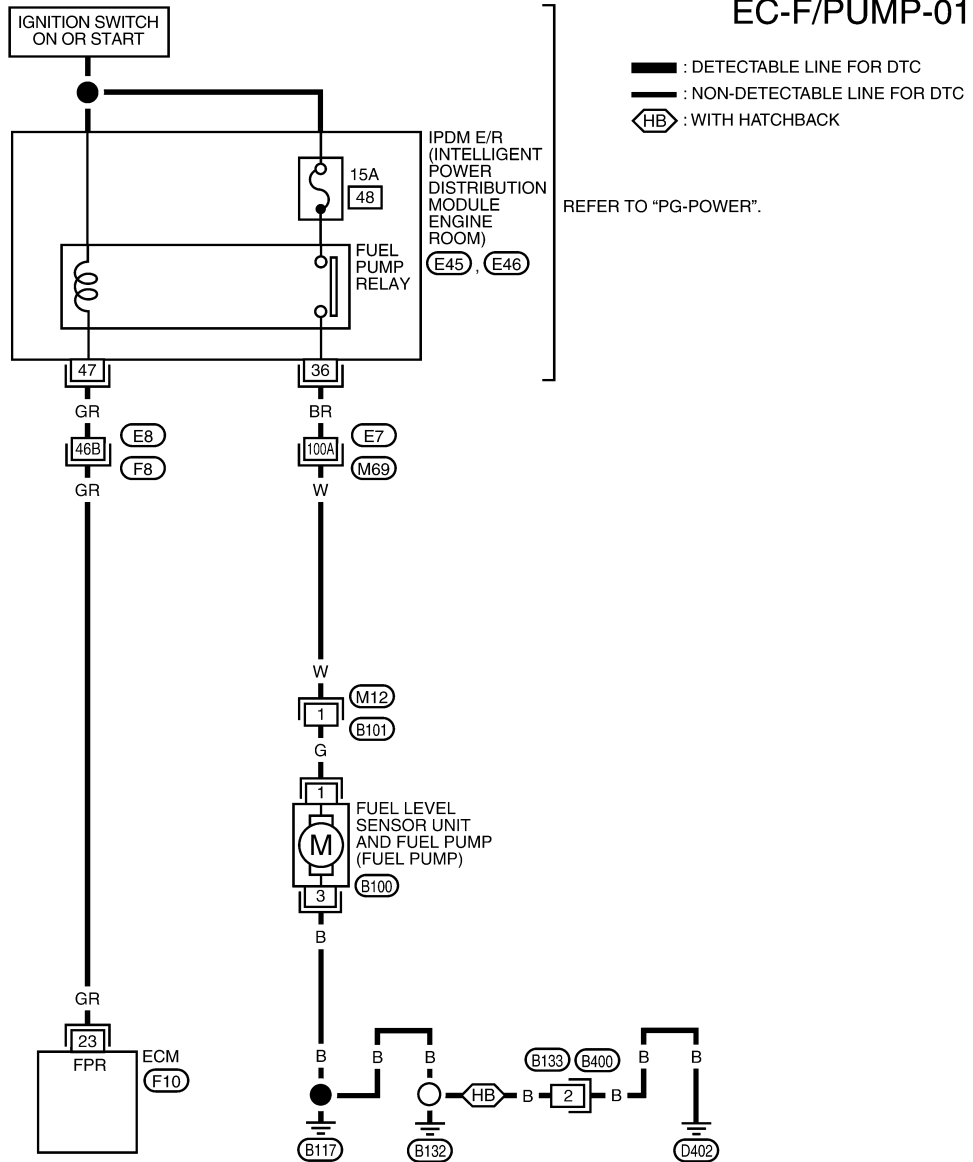
FUEL PUMP

< SERVICE INFORMATION >

[MR18DE]

Wiring Diagram

INFOID:000000005532912



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

FUEL PUMP

< SERVICE INFORMATION >

[MR18DE]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	GR	Fuel pump relay	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.0 V
			[Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)

Diagnosis Procedure

INFOID:000000005532913

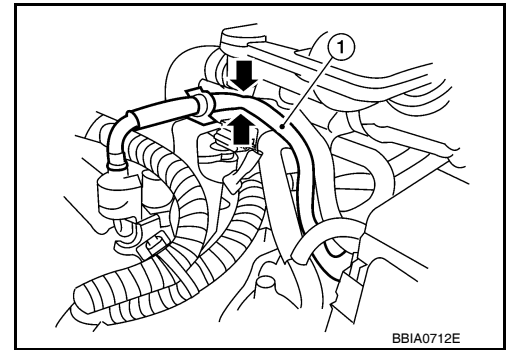
1. CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose (1) with two fingers.
- Illustration shows the view with intake air duct removed.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 2.



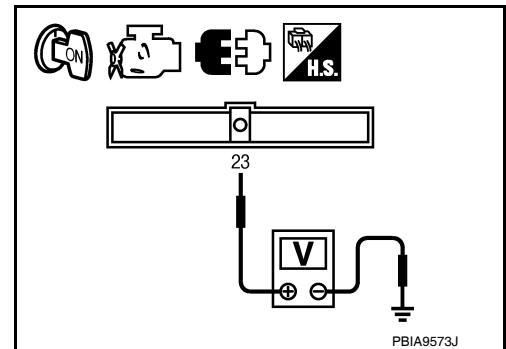
2. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check voltage between ECM terminal 23 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 5.
NG >> GO TO 3.



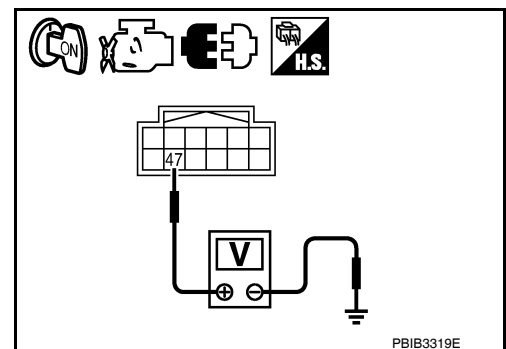
3. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E46.
3. Turn ignition switch ON.
4. Check voltage between IPDM E/R terminal 47 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 11.



< SERVICE INFORMATION >

4. DETECT MALFUNCTIONING PART

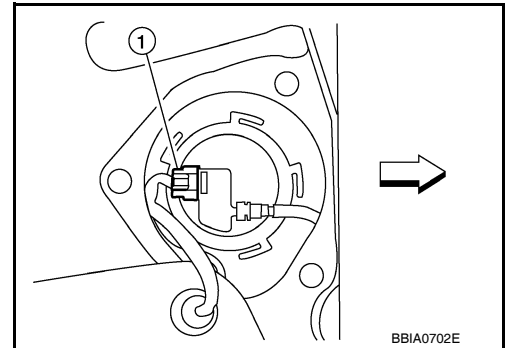
Check the following.

- Harness connectors E8, F8
- Harness for open or short between IPDM E/R and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect "fuel level sensor unit and fuel pump" harness connector (1).
- Illustration shows the view with inspection hole cover removed.
4. Turn ignition switch ON.

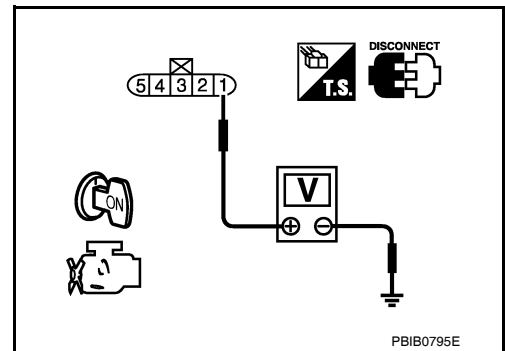


5. Check voltage between "fuel level sensor unit and fuel pump" terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage should exist for 1 second after ignition switch is turned ON.

OK or NG

- OK >> GO TO 9.
- NG >> GO TO 6.



6. CHECK 15 A FUSE

1. Turn ignition switch OFF.
2. Disconnect 15 A fuse.
3. Check 15 A fuse.

OK or NG

- OK >> GO TO 7.
- NG >> Replace fuse.

7. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

1. Disconnect IPDM E/R harness connector E45.
2. Check harness continuity between IPDM E/R terminal 36 and "fuel level sensor unit and fuel pump" terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 11.
- NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M69, E7
- Harness connectors M12, B101

A
EC
C
D
E
F
G
H
I
J
K
L
M
N
O
P

FUEL PUMP

[MR18DE]

< SERVICE INFORMATION >

- Harness for open or short between IPDM E/R and “fuel level sensor unit and fuel pump”

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK FUEL PUMP GROUND CIRCUIT

1. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 3 and ground.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 10.

NG >> Repair or replace harness or connectors.

10. CHECK FUEL PUMP

Refer to [EC-1018, "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> Replace fuel pump.

11. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

OK or NG

OK >> Replace IPDM E/R. Refer to [PG-28, "Removal and Installation of IPDM E/R"](#).

NG >> Repair or replace harness or connectors.

Component Inspection

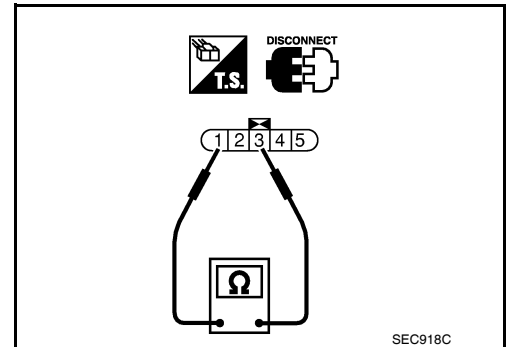
INFOID:000000005532914

FUEL PUMP

1. Disconnect “fuel level sensor unit and fuel pump” harness connector.
2. Check resistance between “fuel level sensor unit and fuel pump” terminals 1 and 3.

Resistance: Approximately 0.2 - 5.0 Ω [at 25°C (77°F)]

3. If NG, replace “fuel level sensor unit and fuel pump”.



INFOID:000000005532915

Removal and Installation

FUEL PUMP

Refer to [FL-6, "Removal and Installation"](#).

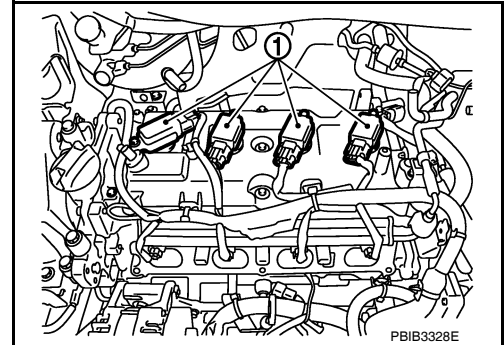
IGNITION SIGNAL

Component Description

INFOID:000000005532916

IGNITION COIL & POWER TRANSISTOR

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil (1) primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.



A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

IGNITION SIGNAL

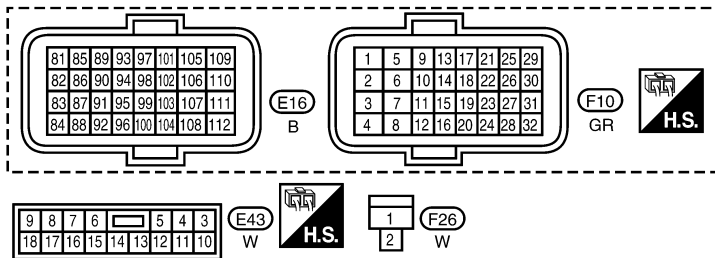
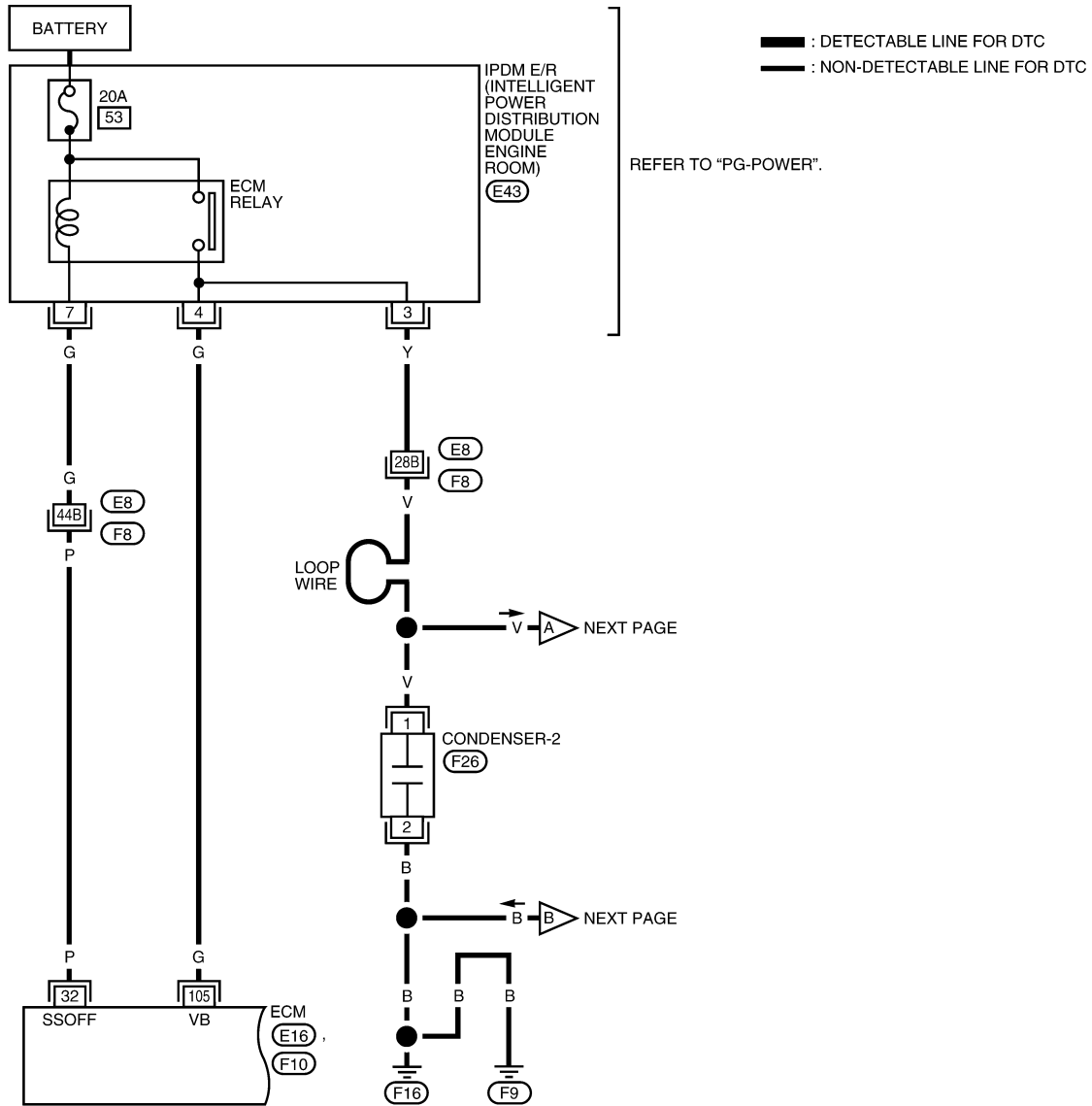
< SERVICE INFORMATION >

[MR18DE]

INFOID:000000005532917

Wiring Diagram

EC-IGNSYS-01



REFER TO THE FOLLOWING.

(F8) - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2658E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

IGNITION SIGNAL

< SERVICE INFORMATION >

[MR18DE]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	P	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.0 V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
105	G	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

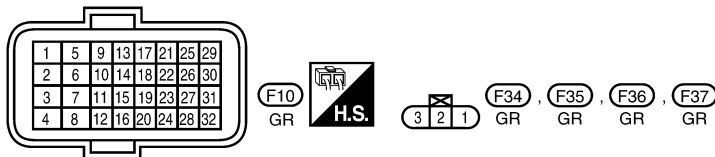
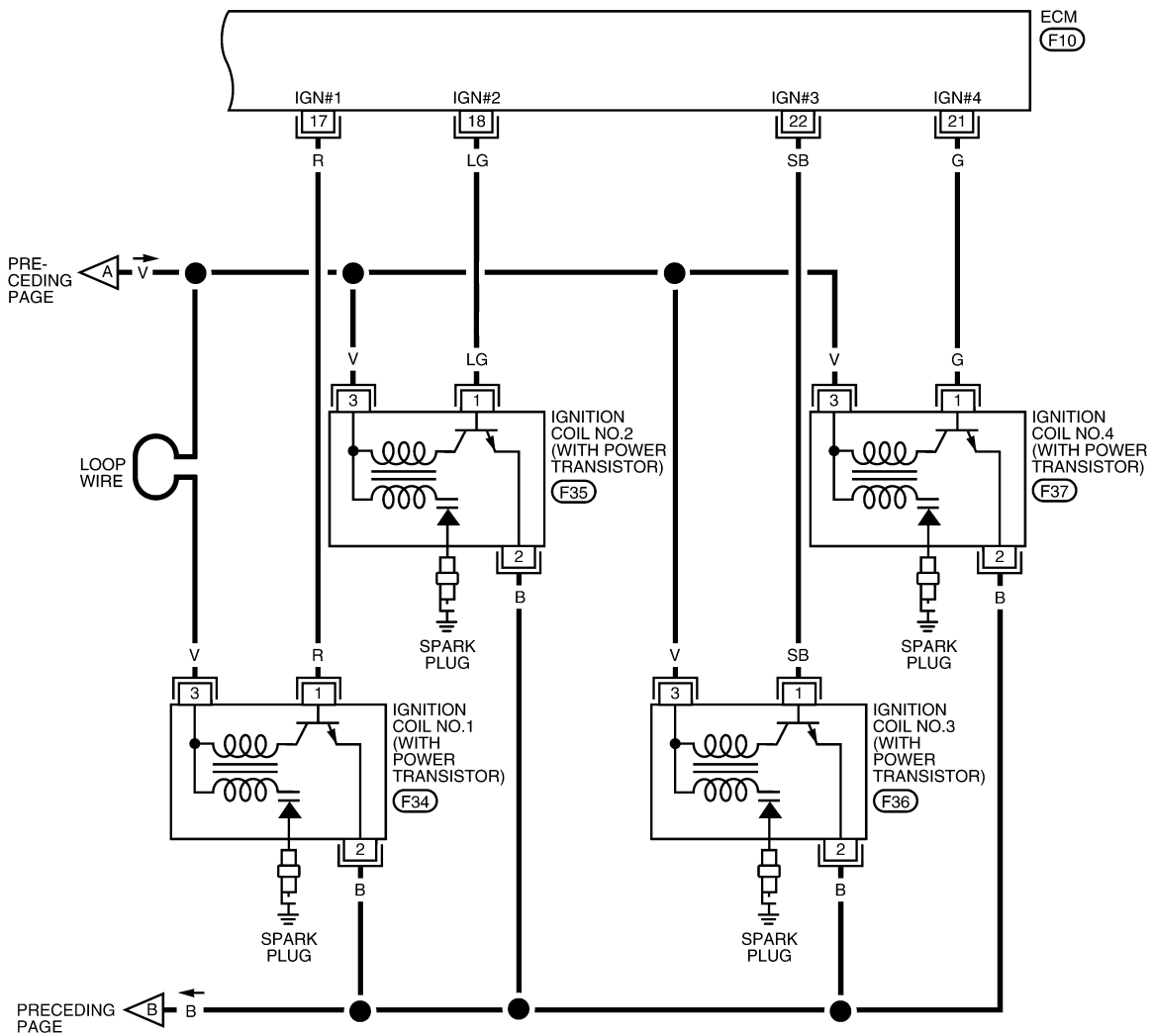
IGNITION SIGNAL

< SERVICE INFORMATION >

[MR18DE]

EC-IGNSYS-02

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA2659E

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

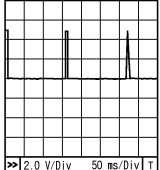
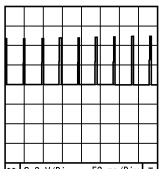
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

IGNITION SIGNAL

< SERVICE INFORMATION >

[MR18DE]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
17 18 21 22	R LG G SB	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 4 Ignition signal No. 3	<p>[Engine is running]</p> <ul style="list-style-type: none"> • Warm-up condition • Idle speed <p>NOTE: The pulse cycle changes depending on rpm at idle</p>	<p>0 - 0.3 V★</p>  <p>PBIA9265J</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> • Warm-up condition • Engine speed: 2,500 rpm 	<p>0.2 - 0.5 V★</p>  <p>PBIA9266J</p>

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005532918

1. CHECK ENGINE START

Turn ignition switch OFF, and restart engine.

Is engine running?

Yes or No

Yes (With CONSULT-III)>>GO TO 2.

Yes (Without CONSULT-III)>>GO TO 3.

No >> GO TO 4.

2. CHECK OVERALL FUNCTION

With CONSULT-III

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.

2. Make sure that each circuit produces a momentary engine speed drop.

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 10.

3. CHECK OVERALL FUNCTION

Without CONSULT-III

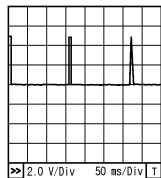
1. Let engine idle.

2. Read the voltage signal between ECM terminals 17, 18, 21, 22 and ground with an oscilloscope.

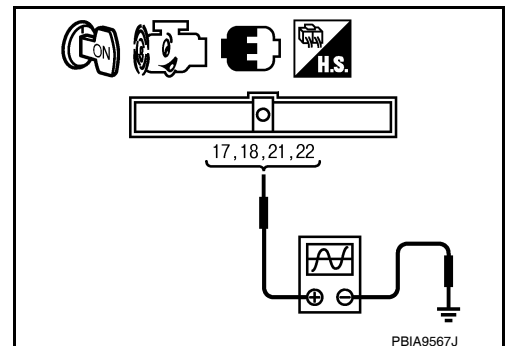
3. Verify that the oscilloscope screen shows the signal wave as shown below.

NOTE:

The pulse cycle changes depending on rpm at idle.



PBIA9265J



PBIA9567J

OK or NG

IGNITION SIGNAL

[MR18DE]

< SERVICE INFORMATION >

- OK >> **INSPECTION END**
- NG >> GO TO 10.

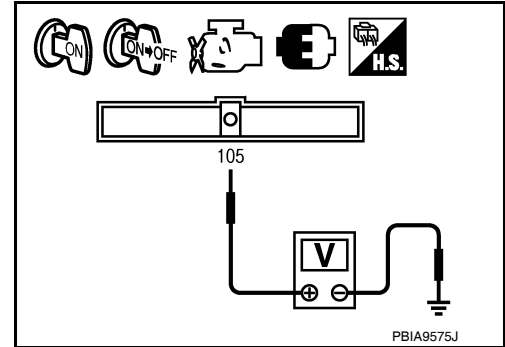
4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check voltage between ECM terminal 105 and ground with CONSULT-III or tester.

Voltage: Battery voltage

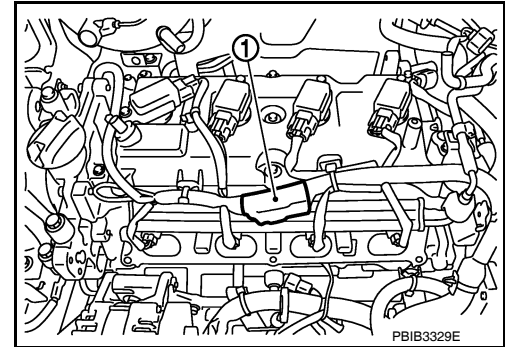
OK or NG

- OK >> GO TO 5.
- NG >> Go to [EC-633](#).



5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser-2 (1) harness connector.
3. Turn ignition switch ON.

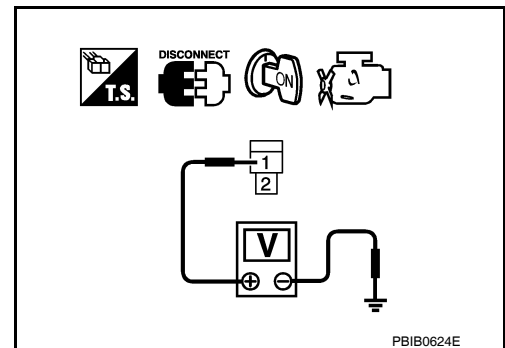


4. Check voltage between condenser-2 terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 8.
- NG >> GO TO 6.



6. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E43.
3. Check harness continuity between IPDM E/R terminal 3 and condenser-2 terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> Go to [EC-633](#).
- NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8

IGNITION SIGNAL

[MR18DE]

< SERVICE INFORMATION >

- Harness for open or short between IPDM E/R and condenser-2

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK CONDENSER-2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between condenser-2 terminal 2 and ground.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to power in harness or connectors.

9. CHECK CONDENSER-2

Refer to [EC-1026. "Component Inspection"](#)

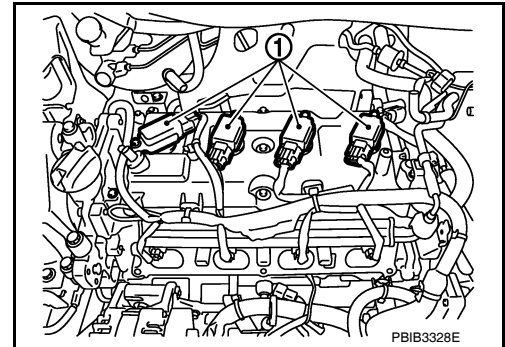
OK or NG

OK >> GO TO 10.

NG >> Replace condenser-2.

10. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect ignition coil (1) harness connector.
4. Turn ignition switch ON.



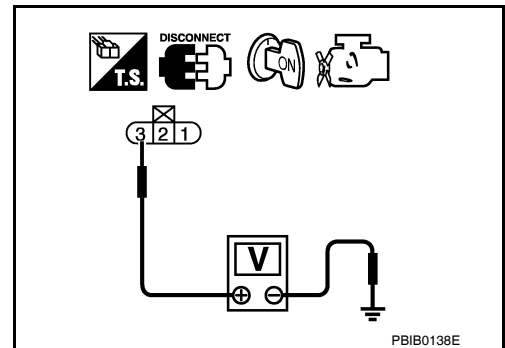
5. Check voltage between ignition coil terminal 3 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 12.

NG >> GO TO 11.



11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector F8
- Harness for open or short between ignition coil and harness connector F8

>> Repair or replace harness or connectors.

12. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

IGNITION SIGNAL

[MR18DE]

< SERVICE INFORMATION >

2. Check harness continuity between ignition coil terminal 2 and ground.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 13.

NG >> Repair open circuit or short to power in harness or connectors.

13. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 17, 18, 21, 22 and ignition coil terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to [EC-1026, "Component Inspection"](#).

OK or NG

OK >> GO TO 15.

NG >> Replace ignition coil with power transistor.

15. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005532919

IGNITION COIL WITH POWER TRANSISTOR

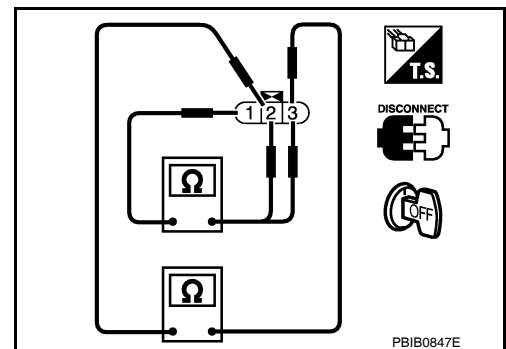
CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Terminal No. (Polarity)	Resistance [at 25°C (77°F)]
1 and 2	Except 0 or ∞ Ω
1 and 3	Except 0 Ω
2 and 3	

4. If NG, replace ignition coil with power transistor.
If OK, go to next step.
5. Turn ignition switch OFF.
6. Reconnect all harness connectors disconnected.



IGNITION SIGNAL

[MR18DE]

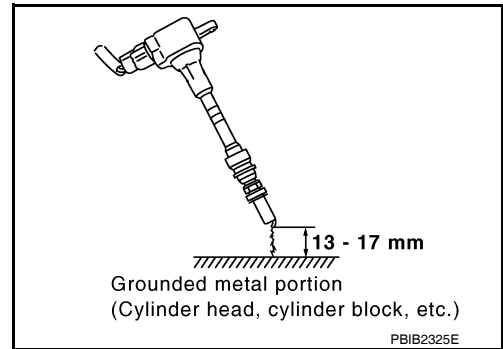
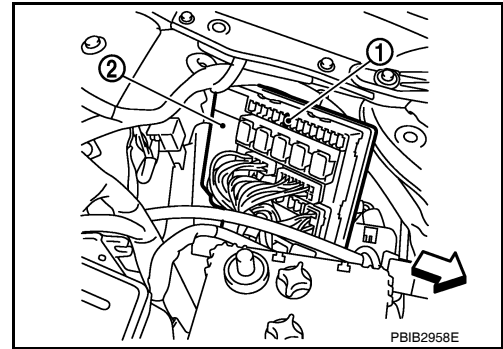
< SERVICE INFORMATION >

7. Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

NOTE:

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- ⇄: Vehicle front
8. Start engine.
 9. After engine stalls, crank it two or three times to release all fuel pressure.
 10. Turn ignition switch OFF.
 11. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
 12. Remove ignition coil and spark plug of the cylinder to be checked.
 13. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
 14. Connect spark plug and harness connector to ignition coil.
 15. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
 16. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- Do not approach to the spark plug and the ignition coil within 50 cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.

NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

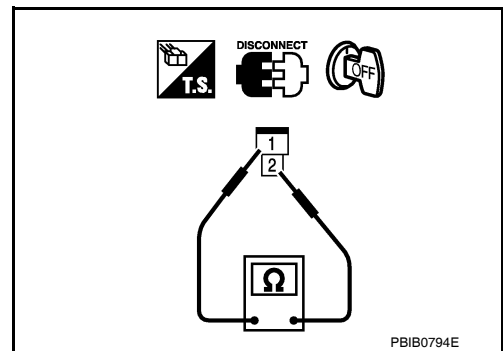
17. If NG, replace ignition coil with power transistor.

CONDENSER-2

1. Turn ignition switch OFF.
2. Disconnect condenser-2 harness connector.
3. Check resistance between condenser-2 terminals 1 and 2.

Resistance: Above 1 MΩ [at 25°C (77°F)]

4. If NG, replace condenser-2.



INFOID:000000005532920

Removal and Installation

IGNITION COIL WITH POWER TRANSISTOR

Refer to [EM-149](#).

REFRIGERANT PRESSURE SENSOR

< SERVICE INFORMATION >

[MR18DE]

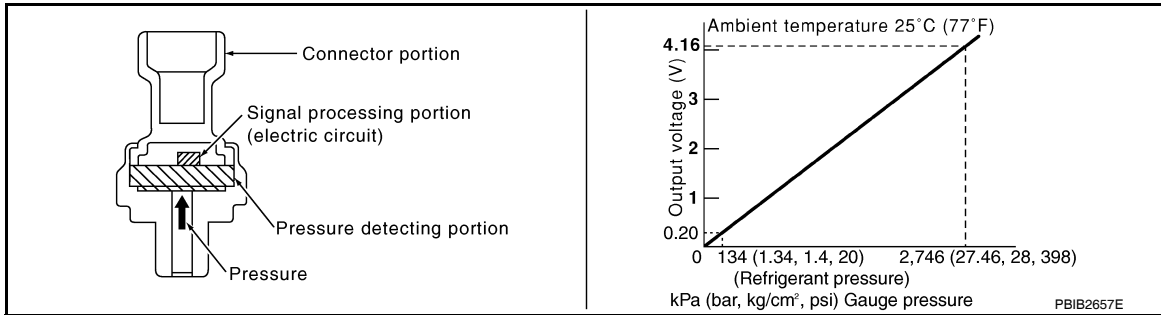
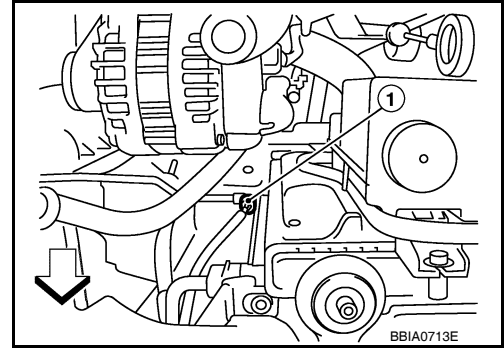
REFRIGERANT PRESSURE SENSOR

Component Description

INFOID:000000005532921

The refrigerant pressure sensor (1) is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.

- ↖: Vehicle front



REFRIGERANT PRESSURE SENSOR

< SERVICE INFORMATION >

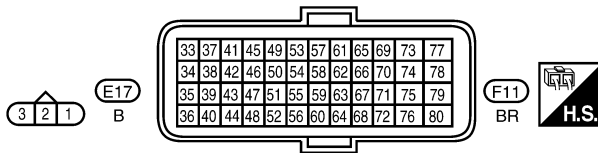
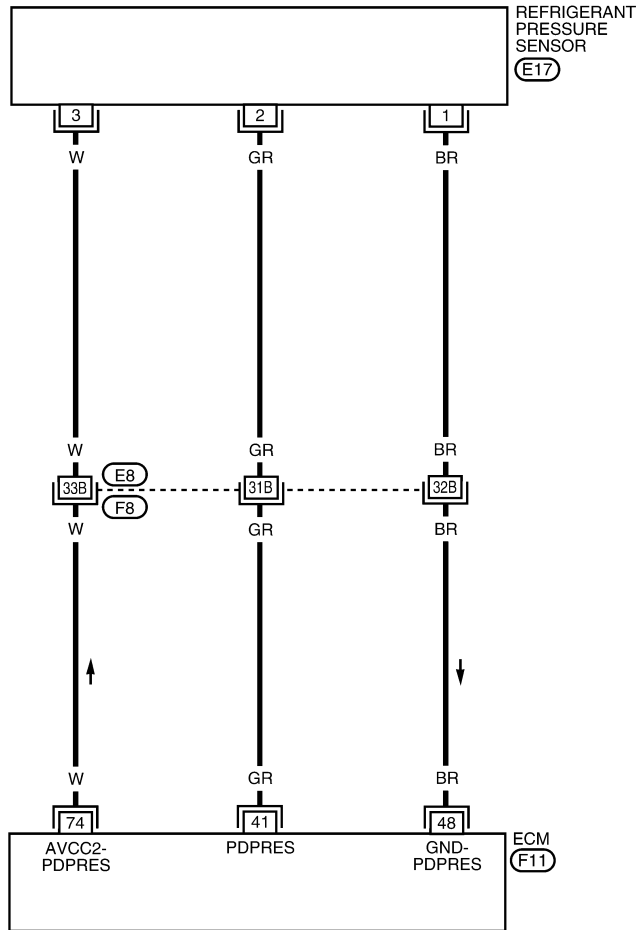
[MR18DE]

Wiring Diagram

INFOID:000000005532922

EC-RP/SEN-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

(E8) - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2662E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

REFRIGERANT PRESSURE SENSOR

< SERVICE INFORMATION >

[MR18DE]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
41	GR	Refrigerant pressure sensor	[Engine is running] • Warm-up condition • Both A/C switch and blower fan switch: ON (Compressor operates)	1.0 - 4.0 V
48	BR	Sensor ground (Refrigerant pressure sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
74	W	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	Approximately 5 V

Diagnosis Procedure

INFOID:000000005532923

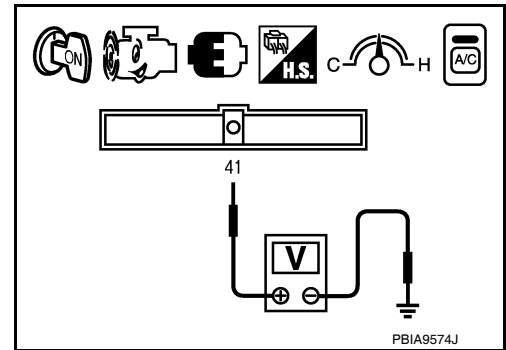
1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower fan switch ON.
3. Check voltage between ECM terminal 41 and ground with CONSULT-III or tester.

Voltage: 1.0 - 4.0 V

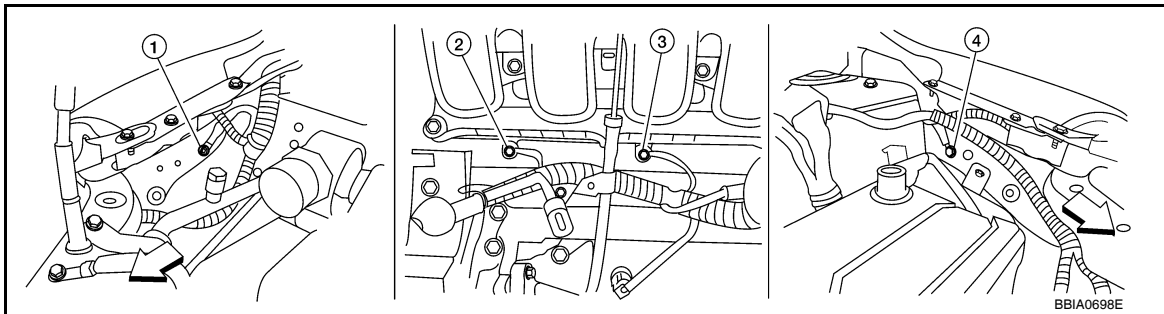
OK or NG

- OK >> **INSPECTION END**
 NG >> GO TO 2.



2. CHECK GROUND CONNECTIONS

1. Turn A/C switch and blower fan switch OFF.
2. Stop engine and turn ignition switch OFF.
3. Loosen and retighten ground screw on the body.
Refer to [EC-638. "Ground Inspection"](#).



↶ Vehicle front

- | | | |
|--------------------|---------------------|----------------------|
| 1. Body ground E24 | 2. Engine ground F9 | 3. Engine ground F16 |
| 4. Body ground E15 | | |

OK or NG

- OK >> GO TO 3.
 NG >> Repair or replace ground connections.

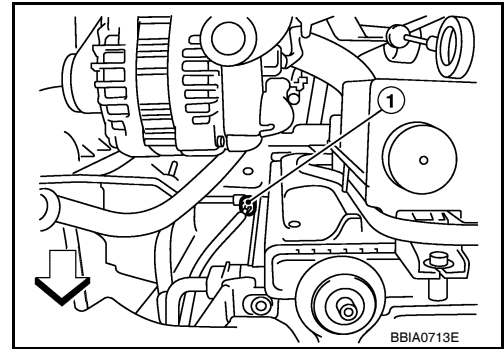
3. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

REFRIGERANT PRESSURE SENSOR

[MR18DE]

< SERVICE INFORMATION >

1. Disconnect refrigerant pressure sensor (1) harness connector.
 - ⇐: Vehicle front
2. Turn ignition switch ON.

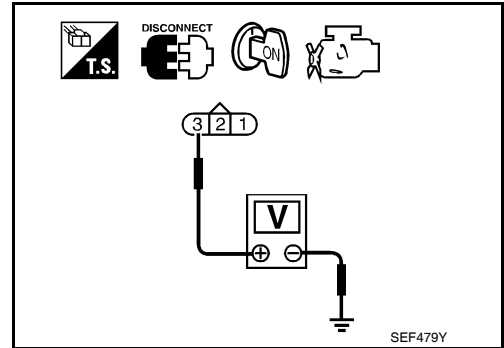


3. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V

OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between refrigerant pressure sensor terminal 1 and ECM terminal 48. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 7.
- NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between refrigerant pressure sensor terminal 2 and ECM terminal 41. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

REFRIGERANT PRESSURE SENSOR

[MR18DE]

< SERVICE INFORMATION >

- OK >> GO TO 9.
- NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-632](#).

OK or NG

- OK >> Replace refrigerant pressure sensor.
- NG >> Repair or replace.

Removal and Installation

INFOID:000000005532924

REFRIGERANT PRESSURE SENSOR

Refer to [MTC-89. "Removal and Installation of Refrigerant Pressure Sensor"](#).

MIL AND DATA LINK CONNECTOR

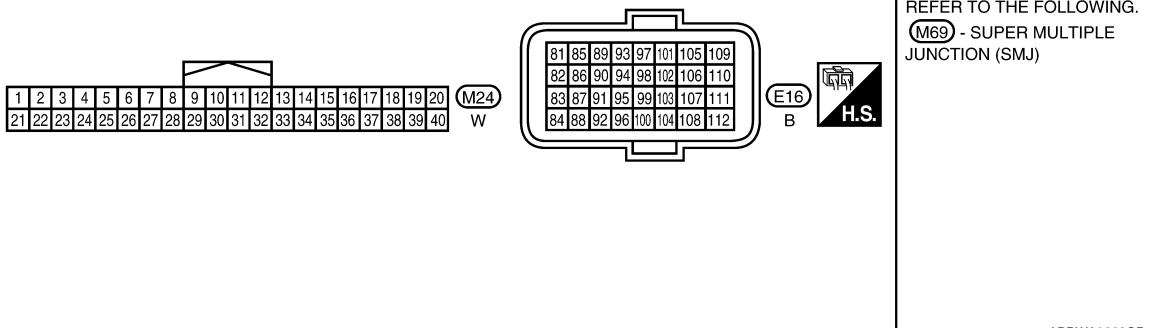
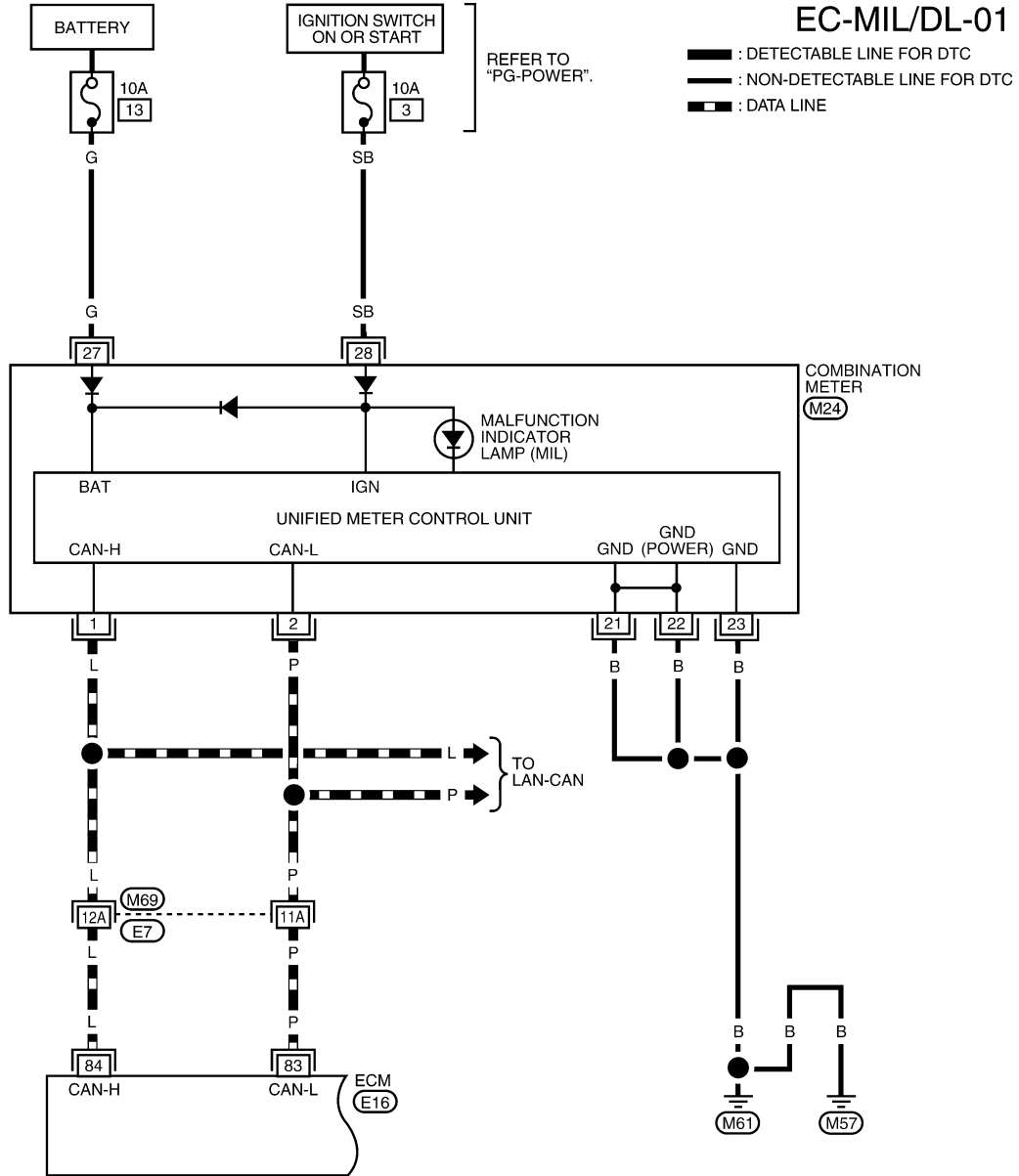
< SERVICE INFORMATION >

[MR18DE]

MIL AND DATA LINK CONNECTOR

Wiring Diagram

INFOID:000000005532925



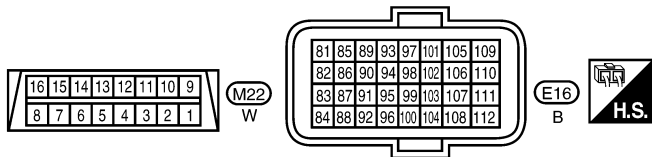
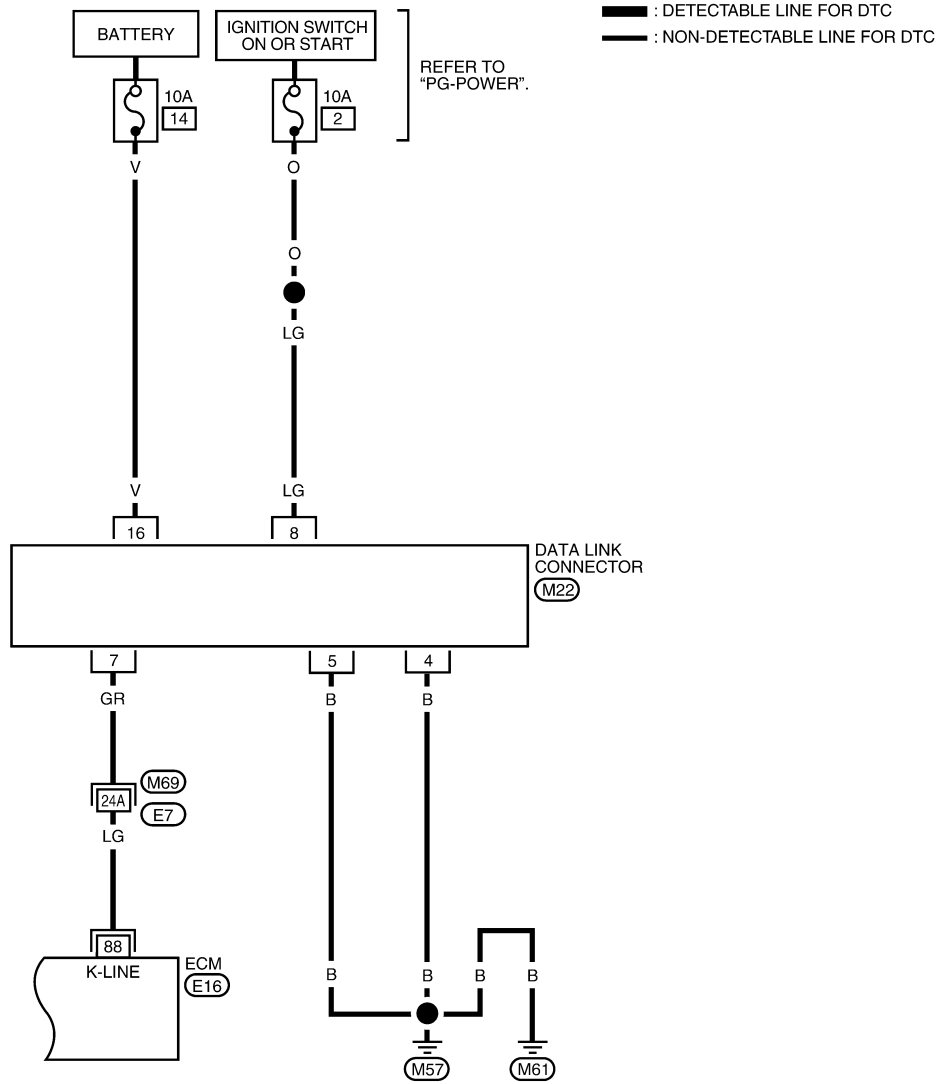
ABBWA0363GB

MIL AND DATA LINK CONNECTOR

< SERVICE INFORMATION >

[MR18DE]

EC-MIL/DL-02



REFER TO THE FOLLOWING.
 (M69) - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2998E

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE INFORMATION >

[MR18DE]

SERVICE DATA AND SPECIFICATIONS (SDS)

Fuel Pressure

INFOID:000000005532926

Fuel pressure at idle	Approximately 350 kPa (3.57 kg/cm ² , 51 psi)
-----------------------	--

Idle Speed and Ignition Timing

INFOID:000000005532927

	A/T	No load* (in P or N position)	
Target idle speed	CVT	No load* (In P or N position)	700 ± 50 rpm
	M/T	No load* (in Neutral position)	
	A/T	In P or N position	
CVT	In P or N position		
M/T	In Neutral position		
Air conditioner: ON	A/T	In P or N position	13 ± 5° BTDC
	CVT	In P or N position	
	M/T	In Neutral position	
Ignition timing	A/T	In P or N position	13 ± 5° BTDC
	CVT	In P or N position	
	M/T	In Neutral position	

*: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

INFOID:000000005532928

	Calculated load value (Using CONSULT-III or GST)
At idle	10 - 35 %
At 2,500 rpm	10 - 35 %

Mass Air Flow Sensor

INFOID:000000005532929

Supply voltage	Battery voltage (11 - 14 V)
Output voltage at idle	1.0 - 1.3* V
Mass air flow (Using CONSULT-III or GST)	1.0 - 4.0 g·m/sec at idle* 2.0 - 10.0 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.

Intake Air Temperature Sensor

INFOID:000000005532930

Temperature [°C (°F)]	Resistance (kΩ)
25 (77)	1.800 - 2.200

Engine Coolant Temperature Sensor

INFOID:000000005532931

Temperature [°C (°F)]	Resistance (kΩ)
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

SERVICE DATA AND SPECIFICATIONS (SDS)

[MR18DE]

< SERVICE INFORMATION >

Air Fuel Ratio (A/F) Sensor 1 Heater

INFOID:000000005532932

Resistance [at 25°C (77°F)]	1.8 - 2.44 Ω
-----------------------------	--------------

Heated Oxygen sensor 2 Heater

INFOID:000000005532933

Resistance [at 25°C (77°F)]	3.4 - 4.4 Ω
-----------------------------	-------------

Crankshaft Position Sensor (POS)

INFOID:000000005532934

Refer to [EC-798, "Component Inspection"](#).

Camshaft Position Sensor (PHASE)

INFOID:000000005532935

Refer to [EC-803, "Component Inspection"](#).

Throttle Control Motor

INFOID:000000005532936

Resistance [at 25°C (77°F)]	Approximately 1 - 15 Ω
-----------------------------	------------------------

Fuel Injector

INFOID:000000005532937

Resistance [at 10 - 60°C (50 - 140°F)]	11.4 - 14.5 Ω
--	---------------

Fuel Pump

INFOID:000000005532938

Resistance [at 25°C (77°F)]	Approximately 0.2 - 5.0 Ω
-----------------------------	---------------------------